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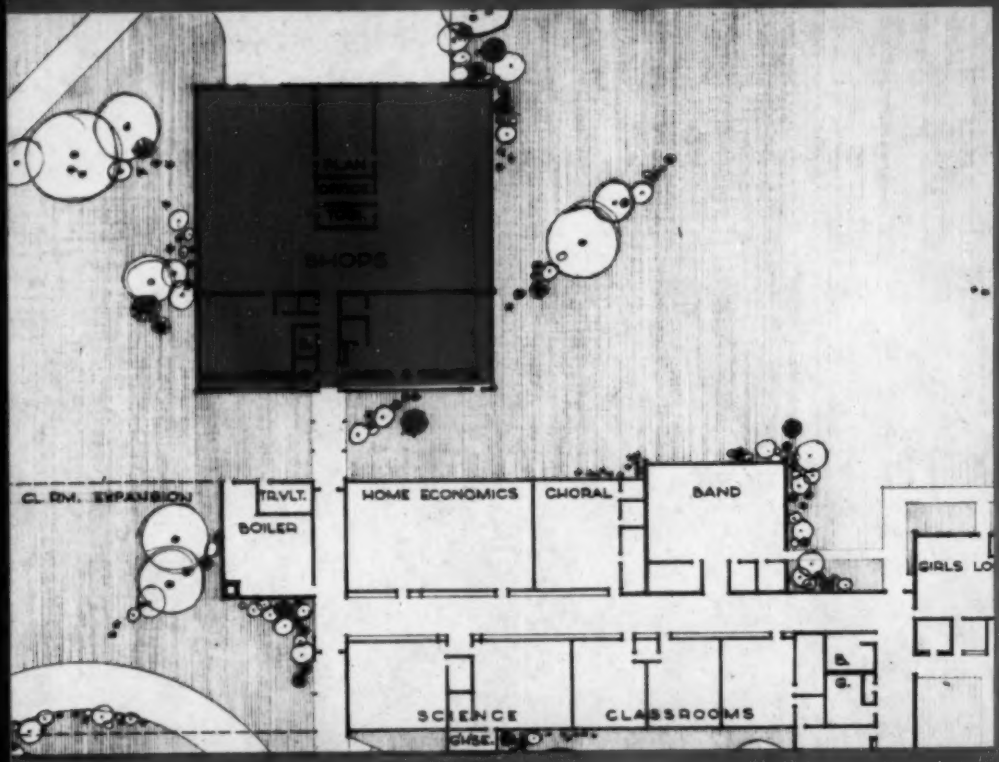

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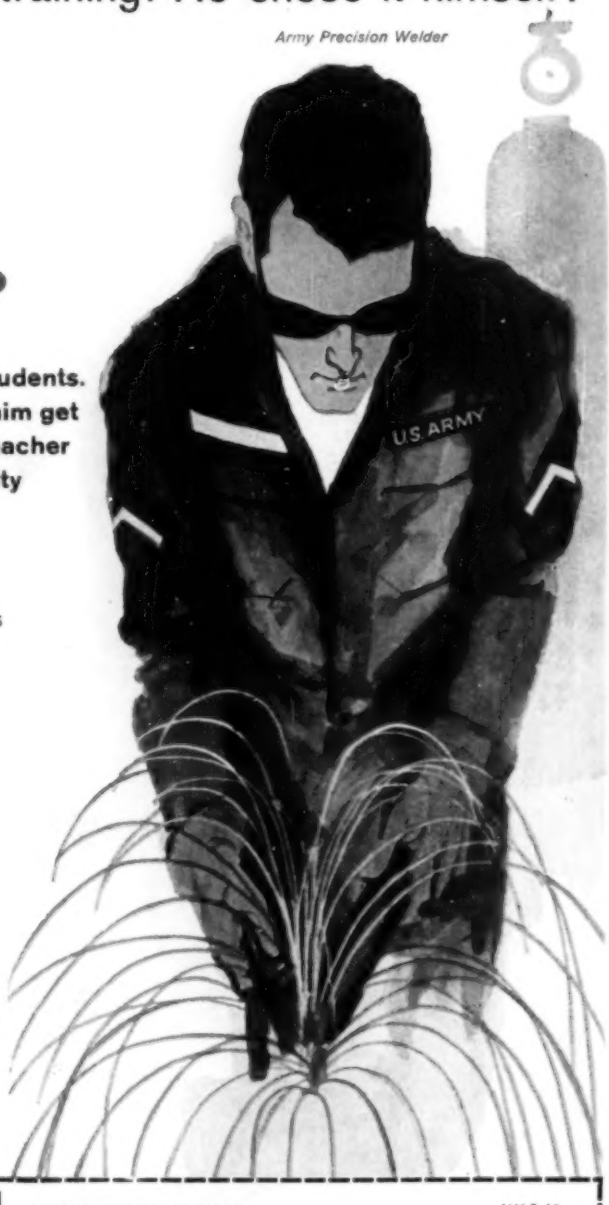

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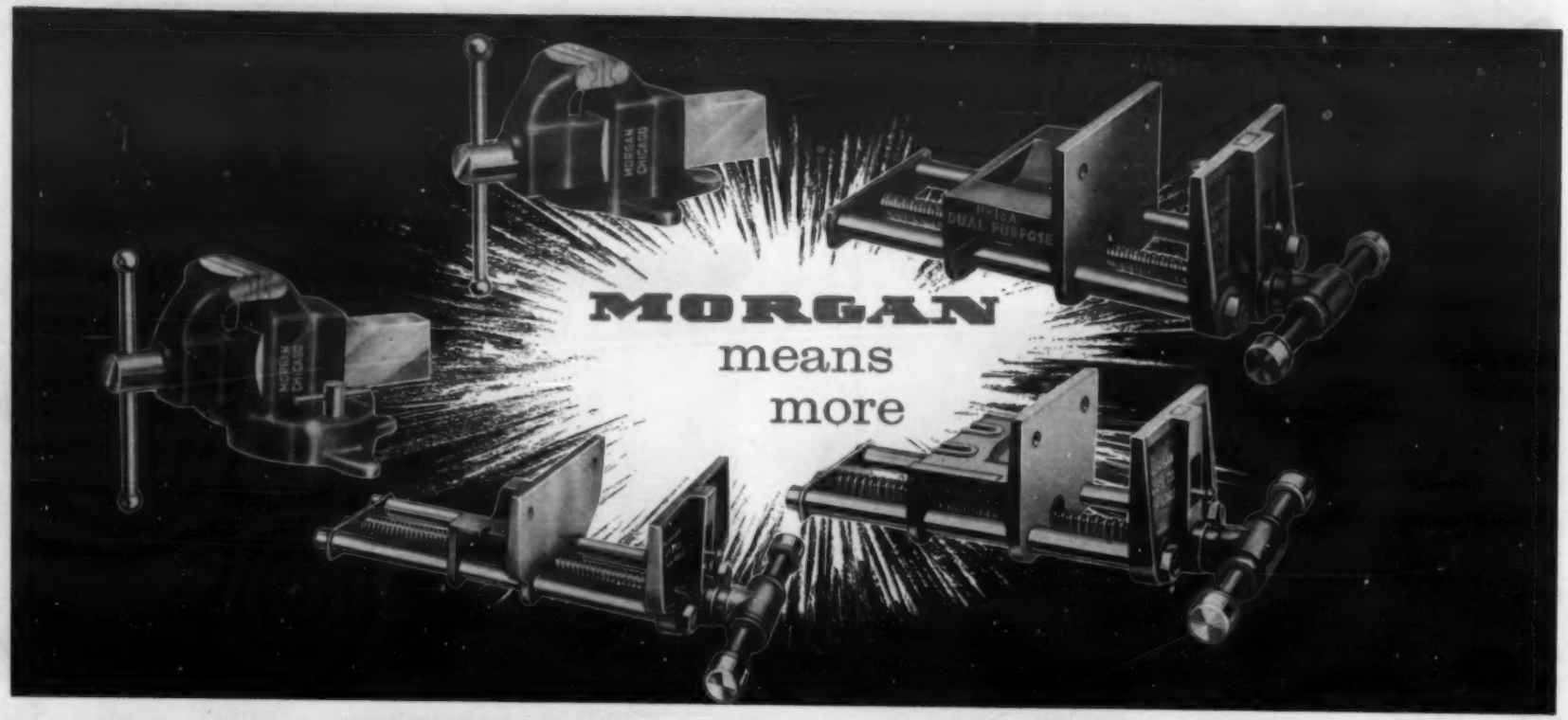

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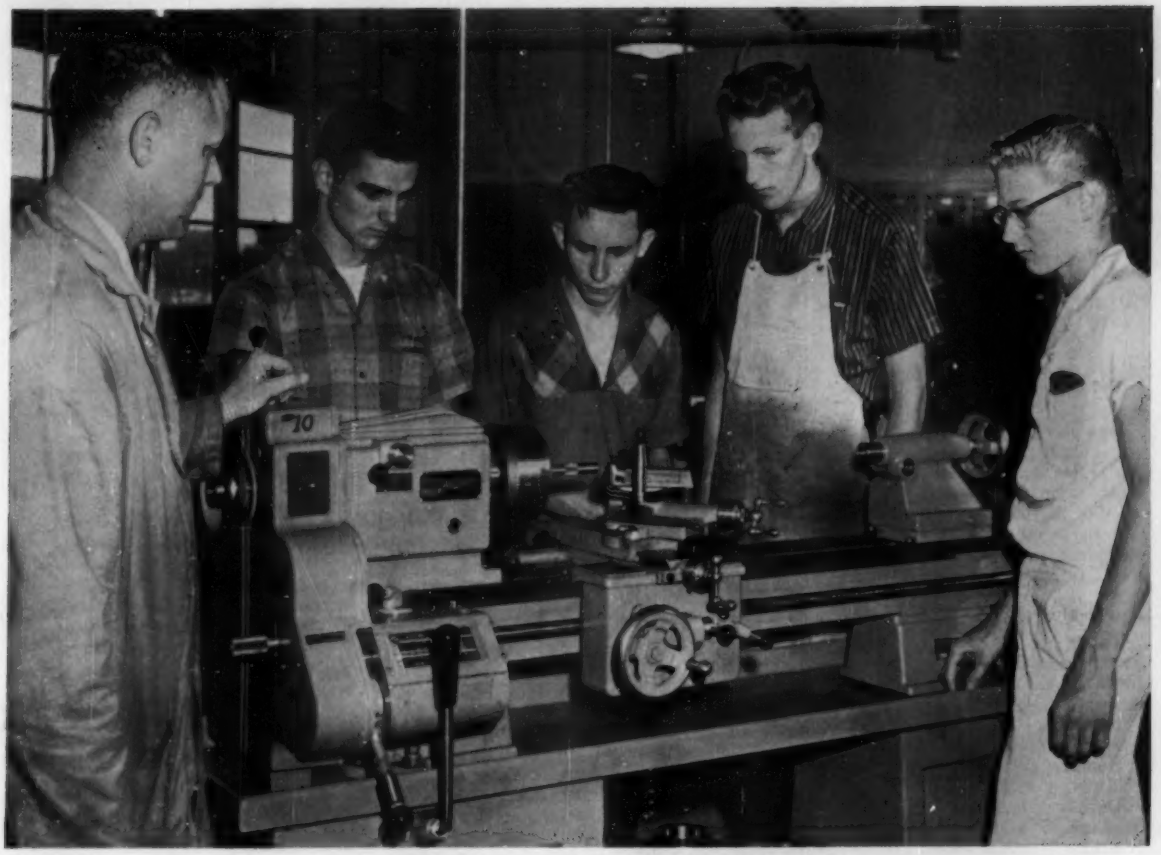

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then and now / changing attitudes toward vital industrial education issues

How have the objectives of industrial arts changed with the passing of the years? Do we feel the same about our contributions to general education as we did 30 years ago? Let's look back and see what some of the leaders in industrial arts had to say about objectives in earlier issues of IA/VE.

Thirty Years Ago

Thirty years ago in the October issue, Professor William L. Hunter of Iowa State College listed these as Industrial-arts objectives:

Invite the boy to explore his interests and aptitudes.

Number educational and vocational guidance among their major aims.

Develop an amateur ability in handling tools and machines.

Utilize opportunities to develop hobbies.

Sample the major divisions of industry.

Teach consumers' knowledges and appreciation.

Regard it important to develop good personal and social habits.

Instill proper attitudes toward workers in other occupations.

Attempt to make the boy a handyman around the home.

Launch juveniles into the world better able to earn a living.

Afford an opportunity to experiment with scientific principles.

Reflect trends in the industrial world.

Tie up with and integrate the other school subjects.

Stimulate creative thinking.

Twenty Years Ago

Twenty years ago in the January, 1940, issue, John F. Friese, writing on the philosophy of industrial arts for American education, made these comments on general objectives:

1. Industrial arts is a great social leveler.
2. Exploration through firsthand study of occupations provides a way of laying the foundation for all vocational and educational guidance.
3. Industrial arts adds to the delights of home, garden, mechanical devices and civic improvements when consumer values are stressed.
4. Studies in social, economic and related occupational problems of interest are important.

He goes on further to state that learning and developmental experiences in industrial arts through types of experiences not otherwise available are essential to the complete social education of every boy in a democratic, industrial democracy.

In the April, 1940, issue, Dr. Homer J. Smith, writing on the broadening responsibilities of industrial arts, suggests these objectives:

1. Industrial arts has always accepted the responsibility for contributing something special to the full development of a youngster.
2. We believe that industrial arts enriches other subjects.
3. The matter of a pupil's school morale might be raised to the status of a major purpose of industrial arts.
4. Leisure interests must engage our attention in a different way.
5. Industrial arts must help in the selection of those to be prepared for a skilled or aristocratic trade.

Would a monthly review of changing attitudes toward vital problems in industrial education similar to the topic and treatment on this page prove helpful to you in your work? Please let us have your ideas on the subject! We are attempting to provide more effective material for you, and this is the third in a series of departments we are testing for your approval or rejection. The first, on page 4 of your IA/VE for January, was "What's His Line" with information on occupations; the second, on page 4 of your IA/VE for February presented facts on industrial education research in "What Does Research Say?"

In April, we hope you'll look for "Interesting People, the Heritage of Industrial Arts," a sketch of an inventor who had something to do with developing today's i-a tools or materials or processes.

Ten Years Ago

Ten years ago in the April, 1950, issue, Edward A. Shattuck, writing on a curricular view of industrial education, stated that the aims of industrial arts include:

1. To provide self-exploration in and information about industrial and related occupations.
2. To provide some skills with and information about tools, materials, drawings, etc.
3. To provide early opportunities for boys and girls to make and do things which they desire to do with tools and materials.
4. To provide the chance for creative experiences in arts and crafts for avocational purposes.
5. To remove the fear element in the use of mechanical devices used in modern industrial society.
6. To develop consumer knowledge and appreciation.
7. To develop good work habits and good attitudes towards work.
8. To develop elementary understandings of social, economic, regulatory factors in our current industrial civilization.
9. To provide opportunities for significant experiences in creative thinking and doing.
10. To provide those valuable developmental experiences associated with learning through doing.

The Objectives in 1960

What should be the objectives of industrial arts in 1960? Are the objectives of 1930 still good? Do we still look upon those of the '40's and '50's as being adequate? Perhaps we need to take a new look at our field and decide which are the most important objectives and then set about the job of making them function properly. What do you think?

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the bulletin board / news notes and trends in industrial education

PRESIDENT'S BUDGET SHIFTS VOC-ED FUNDS

On January 18, President Eisenhower presented his budget to Congress for fiscal year ending June 30, 1961 with a "shift in emphasis. The need for federal assistance," according to the president's budget message, "in the vocational education program began in 1917 . . . for training in agriculture, home economics, industrial trades, and distributive occupations is not as great as . . . training needs in new science-age skills."

The budget calls for $9 million for area vocational education programs authorized under the National Defense Education Act of 1958, which is an increase of $2 million over the amount appropriated last year.

For vocational education under titles I and II of the George-Barden Act, the budget calls for an appropriation of $31,-702,081 for the fiscal year ending June 30, 1961, $2 million less than fiscal 1960. It includes $4 million for practical nurse training; $180,000 for the fishery trades; and $27,267,081 for agriculture, home economics, distributive education, and trades and industry. The proposal calls for an 8 per cent, across-the-board cut for all four services.

The budget recommends a total appropriation of $79.8 billion, which is an increase of $2.7 billion over the budget recommended for fiscal 1960.

AGRICULTURE TEACHER EDUCATORS ORGANIZE

A new organization known as the American Association of Teacher Educators in Agriculture was formed at the American Vocational Association convention in Chicago in December.

Membership of the organization is composed largely of teachers of professional education courses in colleges and universities preparing high school teachers of vocational agriculture. There are now 67 such institutions.

Purposes of the American Association of Teacher Educators in Agriculture are: to provide greater opportunity for exchange of ideas, philosophy, and professional materials among members of the profession; to improve communication with professors of agriculture; to work more closely with other teacher education groups toward the improvement of teacher education standards, and to encourage educational research.

JOB SAFETY WEEK PLANNED

Safety leaders over the nation participated in "Job Safety Week" set by President Eisenhower as the week of February 28–March 5. During that week more than 3000 delegates from the ranks of labor, industry, science, education, and government took part in the President's Conference on Occupational Safety, March 1–3, in Washington, D. C.

In announcing details of the Conference, Secretary Mitchell, who is chairman, said the delegates discussed ways of safeguarding the life and safety of the American worker in a changing environment. The Secretary delivered the keynote address.

TRADE SCHOOL STUDENTS POOR READERS

Figures indicate that 70 to 80 per cent

(Continued on page 10)

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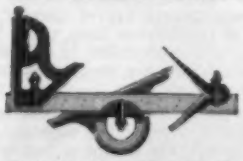

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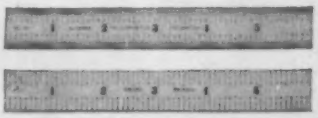

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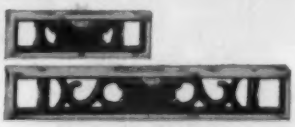

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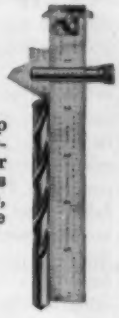

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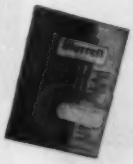

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THE BULLETIN BOARD

(Continued from page 8)

of the students who enter New York City's vocational high schools are seriously below par in reading ability.

The average reading grade of newly admitted trade school students is the equivalent of a normal sixth-year elementary pupil, the survey shows.

School officials explained that they administered a standard reading achievement test to 12,244 boys and girls who entered the vocational schools in 1958. These included 3733 ninth-year entrants from junior high schools.

More than 70 per cent of the elementary school graduates were a year or more retarded in reading, according to the test results. Two pupils were found to read at about the level of a first-year child.

The retardation rate was even higher among the entrants from junior high school. These pupils showed 80 per cent more than a year to as much as seven years below their grade level.

VOC-ED PREDICTIONS ON 1960's SCHOOLS

Dr. Carl F. Hansen, superintendent of schools in Washington, D. C., predicted the following changes in schools in the 1960's, many of which relate to vocational education:

- Overhaul education to include all aspects of training for competence on the job;
- Study what happens to students after they graduate to see how effectively they are being prepared for work or college;
- Provide "a more effective program in cultural and motivational upgrading" for underprivileged youngsters;
- Grow in enrollment, particularly at the secondary level, because of both population trends and "increased holding power" to discourage early dropouts. More youngsters will stay in school for 12 years because "they will have no other place to go";
- Operate on a longer school year and, perhaps, a longer school day.

new safety feature

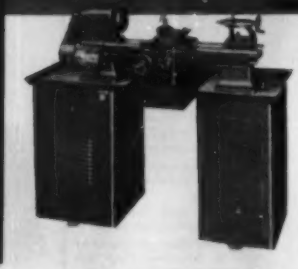
Logan

Automatic Safety Gear now standard equipment on 10" and 11" models

12" Lathe

All Logan 11", 12" and 14" lathes as well as models 1825 and 1875 *(shown)* 10" lathes, now offer positive overload protection without additional cost. Exclusive Automatic Safety Gear absorbs shock of sudden overloads when threading, preventing gear damage from spindle to gear box. Also protects all gears in gear box up to 52 threads per inch. The combination of this Safety Gear and spring-loaded lever-operated clutch in apron gives the same protection for corresponding feeds. Can be factory-installed on other models of new 10" and 9" quick-change lathes. Available for present Logan quick-change lathes: $10 for 9", 10" and 11" sizes, $15 for 12" and 14".

10" Lathe



For full model details and evidence of Logan's low upkeep and better service, see your Logan dealer, or write for catalog.

LOGAN ENGINEERING CO., Dept. D-360, 4901 Lawrence Ave., Chicago 30, Ill.

what's new . . .

- **Completely Automatic Train Operation** (with no crew) is practical today from an engineering viewpoint, according to W. A. Robison, design engineer of Union Switch & Signal Div. of Westinghouse Air Brake Co. Control *system would consist of electronic brains along railroad right-of-way* to make decisions on routing, starting, acceleration, deceleration, and stopping. Dispatcher would supervise train movements from monitoring panel.
- **Smallest Incandescent Lamp Ever Mass Produced** (according to developer, Sylvania Lighting Products) is tiny enough to pass through eye of darning needle. New microminiature lamp, called Mite-T-Lite, has applications in transistorized circuits in missiles, computers, and electronic systems.
- **Improved Detection of Enemy Aircraft and Missiles** is a possibility with eight-ounce refrigerator the size of a flashlight battery. *Refrigerator unit cools airborne infrared target detectors to –350°F to make them ultrasensitive.* Airborne MinIR-cooler detection process, developed by Dr. Howard O. McMahon and William E. Gifford of Arthur D. Little, Inc., *has only one moving part, a small plastic piston.*
- **Cast Aluminum Muffler** is said to minimize internal condensation, a prime destroyer of today's units. Unit is development of Centr-O-Cast & Engineering Co., and Reynolds Metal Co. *It weighs only 60 per cent as much as conventional mufflers; is said to be competitive in cost.* Muffler looks like section of steam radiator and is made in two halves which can be unbolted for inspection and repair. Design is said to be easily adapted to any type of frame and body construction.
- **Leather-Like Synthetic for Shoes** is now in laboratory stage at DuPont. New material is *suede-type synthetic* aimed first at higher priced women's shoe market. Shoe-industry speculation is that base of new material is cushion of nylon. New material, cheaper than leather, would cut down number of shoemaking operations. *Material is porous, stretches without cracking and wrinkling, and is compatible with cement.*

— Armor Research Foundation Newsletter.

. . . in industrial research

FOUNDRIES NEED EQUIPMENT, SURVEY SHOWS

The nation's foundries will need over $509 million in new capital equipment during the next two years, according to a national survey just completed by the American Foundrymen's Society, Des Plaines, Ill., international technical society

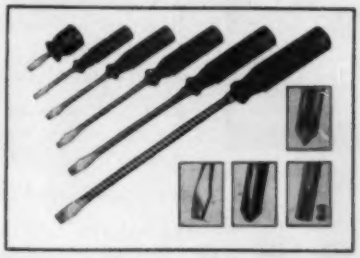
(Continued on page 14)

Snap-on HAS BOTH...
hand tools and shop equipment
for modern automotive training

HAND TOOLS

SOCKET WRENCHES — Sizes and types for every nut-turning job, including single and double hex, deep and "flexocket" types. Wide ranges of handles, tension wrenches and impact wrenches.

COMBINATION WRENCHES — From ¼ to 2-inch size — in long and short handle, midget and offset styles. Available in convenient-to-use sets to match the job to be done.



SNAP-ON SCREWDRIVERS — SNAP-ON has sizes and blade tips for every type of work. Shock-resistant handles; tough, well-anchored blades.

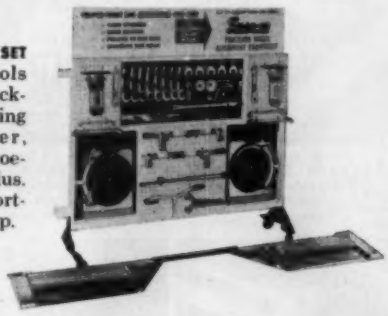
SNAP-ON PLIERS — Built to last longer and work better. Grippers, cutters, needle-nose and specials. Over 60 models and sizes.

SHOP EQUIPMENT

SNAP-ON ANAL-O-SCOPE —This electronic instrument shows an electronic pattern of a car's ignition system . . . instantly spotlights hard-to-find trouble in points, distributor, plugs, valves or ignition. The result is pin-point tune-up.

DISTRIB-U-SCOPE — Test distributors the scientific way. The SNAP-ON Distrib-U-Scope gives quick checkout, accuracy, easy servicing. Nothing can touch it on single-point, dual-point or high rpm checks.

TUNE-UP SET — Four meters — exhaust gas analyzer, tach-dwell, generator-regulator, ignition analyzer — help diagnose engine and electrical system troubles in a hurry.



WHEEL ALIGNING SET — All the tools needed for checking and adjusting camber, caster, kingpin angle, toe-in, turning radius. Simple to use, portable in the shop.

We will be glad to have our nearest SNAP-ON branch arrange a classroom demonstration of these and other SNAP-ON tools.

CHOICE OF BETTER MECHANICS

SNAP-ON TOOLS

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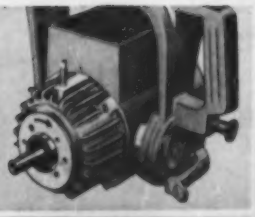
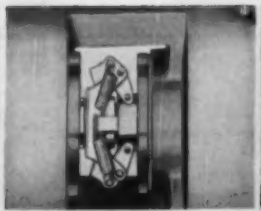
Give your students a head start for the years ahead

...train them with the

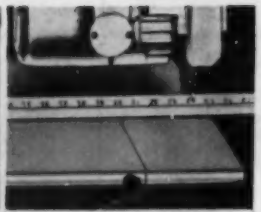
NEW 1030 DeWALT®



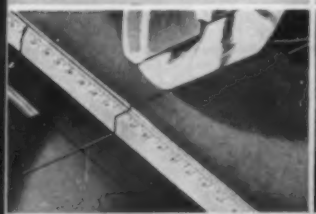
NEW! TOTALLY-ENCLOSED, DIRECT-DRIVE MOTOR, runs on 120/240 volts, AC.



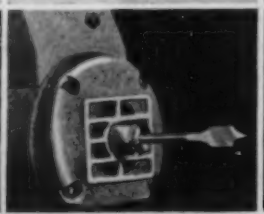
NEW! BUILT-IN ROTO-GRIP Brake, stops tools with electro-mechanical action.



NEW! DROP-LEAF SAF-T-TABLE up front protects operator on wide cuts.(optional)



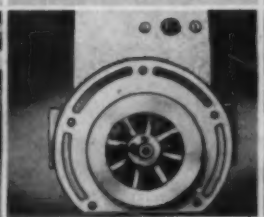
NEW! CUT-OFF SCALE on guide fence makes "repeat" cross-cuts easy.



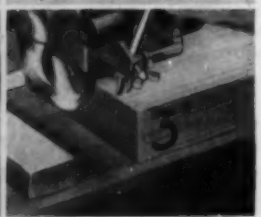
NEW! DUAL-ARBOR MOTOR SHAFT uses right hand tools on back end arbor.

NEW! MOTOR TILTS FULL 360°, multiplies range of shop jobs, adds flexibility.

NEW! "CAM-TYPE" SAFETY KEY SWITCH, works in any direction, protects your students.



NEW! PATENTED COOLING SYSTEM pushes cool air through motor slots at 30 CFPM.



NEW! EXTRA BIG CAPACITY. 10" saw cuts 3" deep, rips over 24" wide on panel stock.

NOW...more than ever...you'll make DeWalt your No. 1 choice for industrial arts and vocational training. This new 1030 DeWalt brings still greater safety, versatility and accuracy plus other extras.

Plan now to include a 1030 DeWalt in your next purchase requisition. Here's a condensed specification guide:

- 10" saw, radial type, model 1030 DeWalt.
- Uniform cantilever arm rotates 360° around the column.
- All operating adjustments and set-ups above the work table.
- Grease-shielded ball bearing head rides on machined trackways inside arm.
- Totally-enclosed, direct-drive, fan-cooled motor delivers 3 H.P.
- Built-in, electro-mechanical brake.
- Cut-off, miter, bevel and rip scales.
- Safety "Cam-Type" key switch.
- 26"x34" steel base with welded handles and 4 detachable legs.
- Big 26"x36" work top with drop-leaf board.
- 10" saw and Auto-Float safety guard with exhaust nozzle and anti-kickback pawl.

(Specify electrical characteristics required)

Compare! See the new 1030 DeWalt demonstrated at your nearby dealer's store. Write for catalog, DeWalt, Dept. IA-603, Lancaster, Pa.

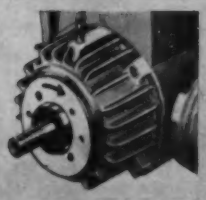
NEW DESIGN...NEW SAFETY...EXTRA POWER
MAKE IT EXTRA EASY FOR STUDENTS TO USE!

UL CSA APPROVED

Auto-Float Guard
and Drop-Leaf Table
(OPTIONAL)

MODEL "1030" AMF DeWALT POWER SHOP*

*T. M. DeWalt Division



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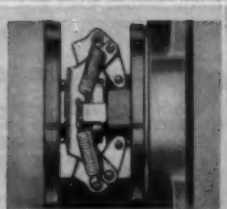
TOTALLY-ENCLOSED MOTOR
direct-drive delivers 3 H.P.
EXTRA POWER WHEN NEEDED!



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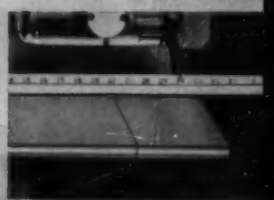
BUILT-IN ROTO-GRIP BRAKE
stops motor instantly
EXTRA SAFETY FOR STUDENTS!



1st

DROP-LEAF SAFETY TABLE
eliminates exposed saw up-front
EXTRA SAFETY FOR STUDENTS!

THE BULLETIN BOARD

(Continued from page 10)

of the metal-castings industry. In addition to these capital needs, the foundries expect to spend nearly $6,800,000,000 for materials, supplies, and special services in producing an estimated 37.6 million tons of finished casting in 1960 and 1961.

This national survey, conducted in connection with plans for the society's 64th National Castings Congress and Exposition in Philadelphia next May, reveals that the foundry industry as a whole anticipates an average increase of 15 per cent in output in 1960, and 20 per cent in 1961.

INDUSTRIAL ARTS AWARDS PROGRAM

Thousands of students in public, private, parochial, and vocational schools in the United States, Puerto Rico, and Canada who have not reached their twenty-first birthdays by July 1, 1960, are eligible to enter the Ford Motor Company's 1960 Industrial Arts Awards competition. (For more information, see pg. 26 of this issue of your IA/VE.)

The industrial arts awards program, now in its fourteenth year, is sponsored by Ford to encourage pride of craftsmanship and creative imagination among students of junior, senior, and technical high schools.

Entry blanks, rule books, and other information on the 1960 competition are now being distributed to industrial arts teachers and other educators.

SHOP-EQUIPMENT WORKSHOP HELD

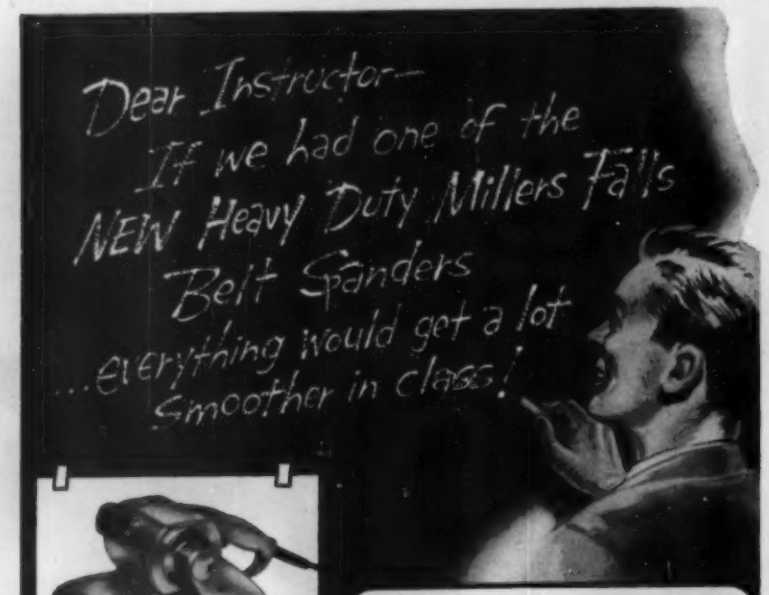
The first known workshop in the country on the care and maintenance of powered shop equipment was held recently at Kent State University, Kent, Ohio.

The workshop, presented by the industrial arts department at Kent State University, was designed to provide: (1) practical machine-tool construction equipment information, (2) actual physical opportunities to solve machine-tool breakdown problems, and (3) chances to tackle situations involving schematic interpretations and parts ordering.

The program was specifically geared for industrial arts teachers and industrial arts supervisors.

Twenty-two local district teachers participated in the workshop which was organized by Professor E. W. Tischendorf, head of the industrial arts department at KSU and director of the workshop.

The program, in two parts, was led by William McLachlin, school sales manager for the Rockwell Manufacturing co. of Pittsburgh.



MODEL NO. 830 — 3" x 21" belt. ¾ H.P. Motor. $74.50

MODEL NO. 840 — Big capacity workhorse sander. Specially designed to permit sanding right up to vertical surfaces. 4" x 21" belt. 1 H.P. Motor. $84.50

Millers Falls new heavy-duty portable electric sanders are precision engineered and ruggedly built to stand the toughest school shop use. Lightweight and perfectly balanced, they are easy to use in any position . . . horizontal, vertical, overhead.

Advanced features, several of them Millers Falls exclusives, include: Slip-proof timing belt drive • Powerful Millers Falls built motors • Anti-gouge backrest • Long-life ball and needle bearings insure efficient, trouble-free operation • "Fine-thread" tracking adjustment and fast, lever-action belt changer make them easy for beginners to operate.

For smoother work in your shop classes choose Millers Falls new Heavy-Duty Belt Sanders.

MILLERS FALLS TOOLS SINCE 1868

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Dept. IA-54, Greenfield, Massachusetts

my creed . . .

- I believe that education — and vocational education in particular — is vital to our industrial, social, and economic progress and that I should support and foster it to the best of my ability.
- I believe that I can profit from the past experiences of our vocational leaders, and by knowing of their experiences, alert myself to the ever-changing needs of industry and education.
- It will work to improve the standards of our administrative and teaching personnel, and with each step will stress the importance of craftsmanship as the first prerequisite of the instructor of our future tradesmen.
- I will never lose sight of the fact that every workman is a citizen of his community, state, and nation, and as such must be trained to assume the full responsibilities of citizenship.
- I will remember that each trainee is an individual endowed with special aptitudes and abilities whch I wll explore and help him to develop.
- I believe that an important part of my work is to develop leadership qualities in myself as well as in my associates, and to that end will strive to keep self-interest from being my first aim.
- I will work toward a goal of attaining the integration of our interests and complete co-operation among industry, labor, and all fields of education.
- I will co-operate with state and national agencies, always remembering that my special obligation is to my school and community, and knowing that this obligation can best be discharged by keeping my community informed about our objectives and progress, and by actively soliciting community participation in improving the program.
- I am proud to be an American, and as I live by my creed, I will be conscious of the challenge it brings in making me more fully discharge my duties and meet my responsibilities as a citizen of this great republic.

— Kansas Industrial Education Newsletter

. . . as a vocational educator

SURVEY ON SCHOOL DISCIPLINE

"Spare the rod, but don't spoil the child" is the preliminary conclusion of a study on discipline carried out by Dr. Lawrence

(Continued on page 100)

(For more information from advertisers, use the postcard on page 155)

DIAMALLOY®

"There is nothing finer than a DIAMOND"

The DIAMOND and DIAMALLOY trade-marks assure the user lifetime service satisfaction in wrenches, pliers and snips. The finest tools have these trade-marks...

DIAMOND

DIAMOND

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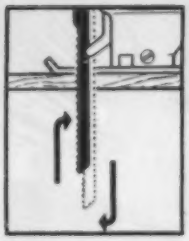
Manufacturers of fine forgings for over fifty years!

DIAMOND TOOL *and Horseshoe Co.*

DULUTH, MINNESOTA • TORONTO, ONTARIO

NEW! SKIL JIG SAW

CUTS 2x6 IN 14 SECONDS!



SKIL'S ORBITAL CUTTING ACTION backs the blade away from work on the downstroke. Eliminates drag for faster cutting.

We never argue when shop instructors tell us the new SKIL Model 514 Jig Saw is the handiest portable tool in the shop.

It crosscuts, rips, scrolls, notches . . . cuts lumber up to 2", plywood, compositions, plastics and metal . . . any shape from straight lines to circles . . . even makes its own starting hole for pocket cuts. Ask your SKIL distributor to let you try one today. Or mail coupon for complete information.

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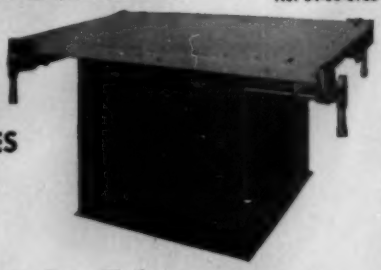
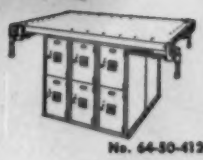
LOCKER BASE FOUR-STUDENT WOODWORKING BENCH

No. 64-50-3128

NOW AVAILABLE WITH BASES SET-UP OR KNOCKED DOWN



PARENT Storage Base Work Benches are 64" long, 50" deep and 35¼" high with 2¼" thick laminated edge grain maple tops. Tops have wooden or "T Iron" end bolsters and 4 woodworkers' vises. Locker bases have 12 box lockers, each 18" wide, 12" deep and 10" high (see above); or 12" wide, 21" deep and 15" high. Cabinet base benches have 2 cabinets, each 36" wide, 21" deep and 31" high; each with an adjustable shelf.



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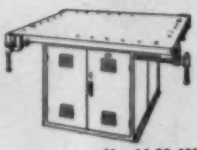

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Only $170.00

UNIVERSAL BENCH BRAKE for school shops

A quality tool accurate and easy to operate. Versatility makes it ideal for training. Popular in commercial sheet metal shops for light production, box and pan work. Replaceable bronze bushings provide long machine life. Available in 3 and 4 ft. models, universal or plain. Write for Bulletin U 322I.

Rated Capacity: 16 flange on 22 gage mild steel, full brake length. Fingers of case hardened steel in widths of 2, 3 and 4 inches permit 3 inch box and pan depth. Other Prices of the Bench Series

4 ft. Universal,	$225.00
3 ft. Plain,	125.00
4 ft. Plain	155.00

All prices F.O.B. Old Saybrook, Conn.

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Old Saybrook, Conn.

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the new **WILTON** Universal Turret Vise

FOR GENERAL SCHOOL SHOPS

FEATURES:
3" x 7" MAPLE JAW FACES
Wilton's patented RAPID ACTION
REMOVABLE 1" x 4" SERRATED STEEL JAWS
DOG IN FRONT JAW • WOOD HANDLE
ART METAL SOCKET • OFFSET WOOD JAW
FOR VERTICAL CLAMPING OF
LONG WORK PIECES

The Wilton "Universal" is a *new tool* that makes the general school shop truly practical! It helps you expand your curriculum at minimum equipment cost. It holds metal, wood, art metal anvils, sheet metal, pipe — *everything* you want to teach!

U. S. Patent 2430458
Additional U. S. Pat. Pending

WILTON PROFESSIONAL QUALITY VISES FOR SPECIALIZED SHOPS

WILTON WOODWORKERS' VISES
they're wearproof and boyproof!
Unconditionally guaranteed!

WILTON MACHINISTS' VISES
with lifetime sealed in lubrication!
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WILTON TOOL MANUFACTURING CO., INC. VE-30
SCHILLER PARK, ILLINOIS

Gentlemen:

☐ I would like to see a demonstration of the new Wilton Universal Turret Vise for General Shops.
☐ Please send me more information on Wilton Vises.

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CITY _____ STATE _____

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DESIGNED

to teach basic machining skills with minimum investment

U.S. — BURKE Milling Machines offer ease of instruction on all standard milling operations, help teach fundamental principles through duplication of actual shop operations in miniature.

- Perform All Standard Milling Operations
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- Within Cost Range of School Shops
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The NEW. U. S. MILLRITE

Large Capacity! Low Price!

The MILLRITE, a full size ram and turret vertical milling machine, permits training students on the type mill they will later operate. And yet its cost, competitive even with used machines of similar capacity, puts it within the reach of all schools.

BURKE BENCH MILLERS

Burke Bench Millers — 2 hand, 2 power feed models. #9 B & S Taper • Heat treated, ground spindle mounts in Timken bearings • ½ HP standard or gear-head, or ¾ HP Lima motor • 3 spindle speeds with standard, 12 with Lima motor • Range 66 to 2875 RPM depending on motor selected.

WRITE FOR FULL INFORMATION AND QUOTATION

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pros and cons / an open forum for your views

on new year's resolutions

May I take this opportunity to congratulate you on your editorial in the January issue of the IA/VE magazine. I admire your courage to take such a stand. Certainly it is what is needed to put industrial arts on a defensible basis in our secondary schools. Anything less than what you outline gives us a very weak leg on which to stand.

I have great fear as to how we would fare if a critical inspection and evaluation were made of industrial arts work nationwide if the inspection team were educators other than industrial arts teachers.

Walter A. Klehm
Head, Department of Industrial Arts
Eastern Illinois University, Charleston

for more research

This is to express appreciation of and the continuing need for a monthly review of the important research in our field. (See "What Does Research Say? in your IA/VE for February, pg. 4.")

We need to have the results of research brought before us more often than has been done in the past. I would use research material myself and I would direct my students to this type of information as well.

Lawrence S. Wright
Associate Professor of Industrial Arts
Iowa State Teachers College, Cedar Falls

mosaics in the woodshop

In reference to Mr. Kinnaman's article, paragraph 3, cutting blocks to size after ripping. (See your IA/VE for January, p. 13.) While working in the industry (cabinetmaking), often were the occasions that small pieces of that sort had to be cut, including dowels of all diameters, besides pieces ¼ by ¼ by 1 in. We would make a push block similar to that used on a jointer. The difference being that the underside was cut out, or dadoed, if you please, to the desired size to suit the stock. This was usually a piece of two by four, used on a circular saw.

To make this, obtain a piece of 2 by 4, slightly longer than needed. Face one side, then join two edges square with this face. Then cut a dado of required width and depth. These two measurements are governed by thickness and number of lengths to be cut at one time. Then, for ease in handling, make a handle, or a knob may be used for control of push block. This should be placed at a position that will be comfortable, for gripping, pushing, and applying pressure.

Set fence for the required length, insert pieces in dado of block, and make the first cut. This one is usually the "squaring-off" cut. Then proceed to cut remainder. Remember to push stock well beyond back of saw blade. The pieces cut, may be left on table for the next group, which when pushed same as the first one, will push the stock already cut closer to the edge of the table. Each succeeding cut will push off previous stock and a container well placed on the floor will catch the stock as it falls off table. And on occasions, when the total pieces numbered into the thousands, I would set up a counter to record the number of times that the push block went past the saw blade. This was set on the fence, and a dowel pin acted as the trip lever. The registered number would then be multiplied by the number of pieces being cut at one time to arrive at the total.

This method is a time saver, and 100 per cent safe, as there is no danger of a "kickback" whatsoever. The pieces are kept under cover at all times, until the operator raises the push block. I've used this method many times to cut plugs from ¾-in. dowels, ¾ in. long, that were used as plugs by exterminating companies. I am sure this will be very helpful to others besides Mr. Kinnaman.

My thanks to Mr. Kinnaman in helping to solve my "waste stock" problem.

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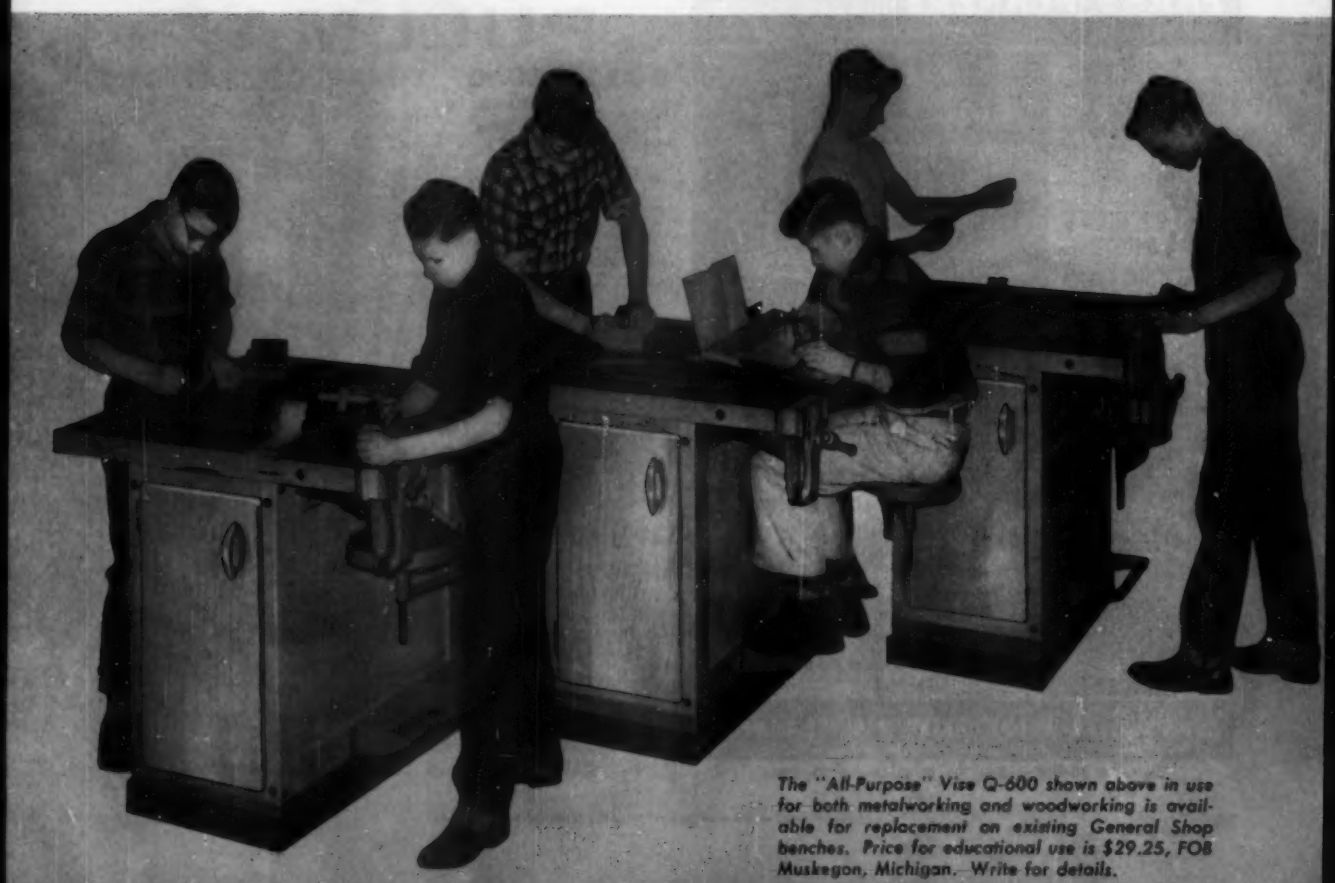

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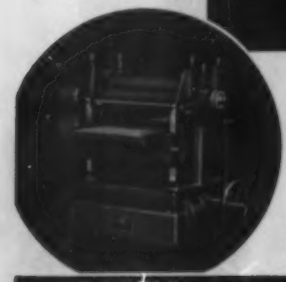

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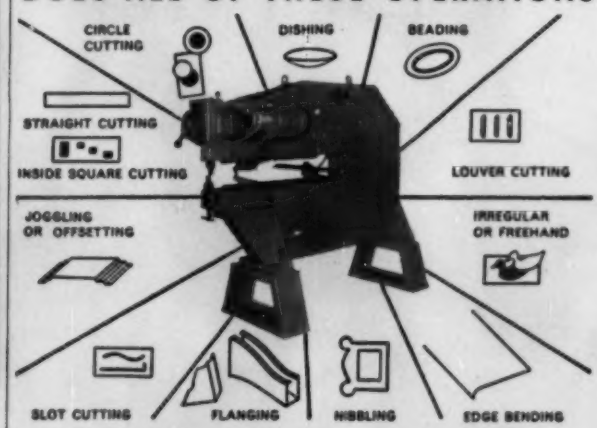

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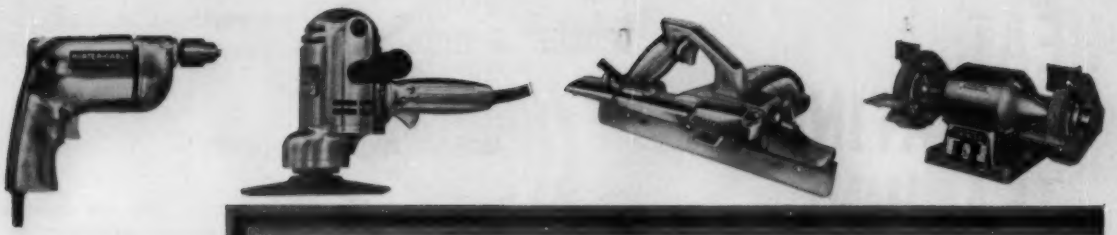

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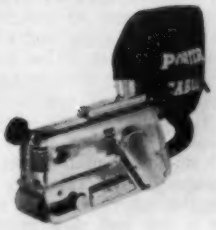

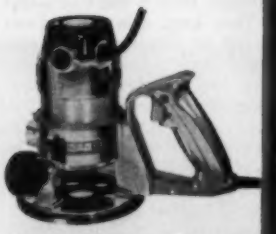

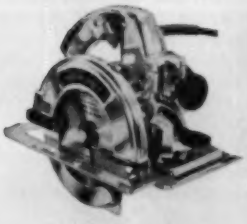

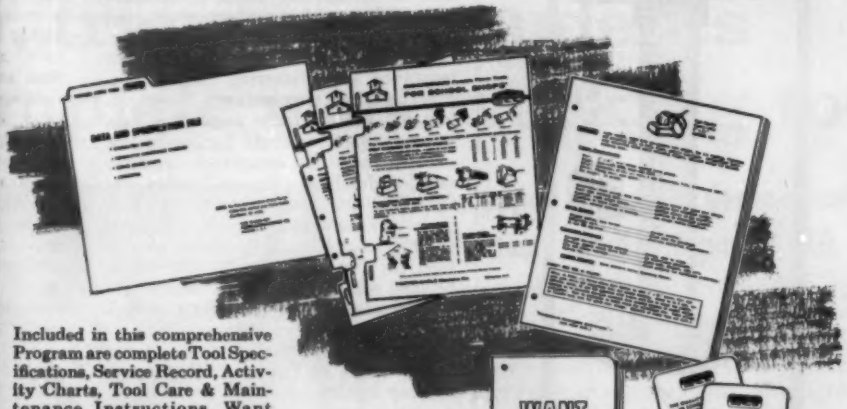

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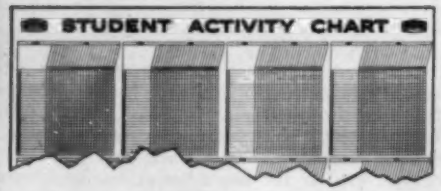

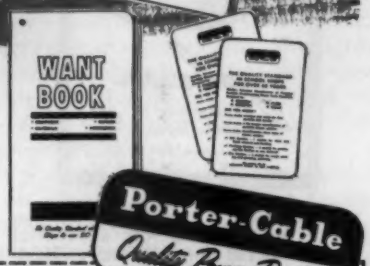

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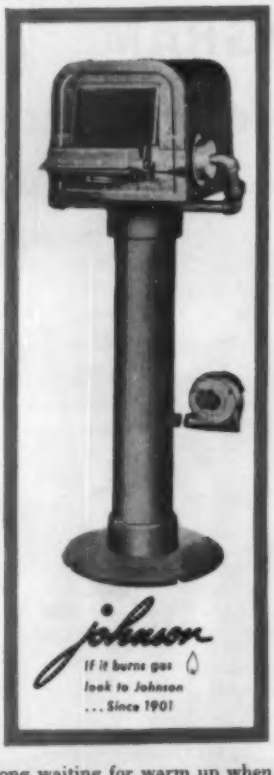

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WHAT ARE SILICONES?

Silicones are the result of an unusual blending of sand and oil. Sand, the basic material of glass, gives this blend some of the best features of glass. Oil, sources of many plastics, gives silicone some of the special qualities that have made plastics so useful.

In recent years many new and practical uses of silicones in industrial finishes have been developed. Among these developments are the coatings that are resistant to heat and corrosion. As coatings for smokestacks, mufflers, and similar equipment, they have proved their value. Silicone finishes also are used as coatings for stoves and space heaters to replace the dull browns and blacks with bright colors without sacrificing performance or serviceability.

Silicone enamels provide finishes that approach the heat resistance of porcelain. Although the major use has been on heating equipment, silicone modified finishes have given excellent performance on refrigerator cabinets, bathtubs and similar products where water and soap resistance is of utmost importance. Silicone coatings also have excellent resistance to weathering, water, sunlight, and low temperatures. These important factors can be formulated into silicone-organic enamels for application on appliances and equipment requiring exterior durability. As used today, the term "silicone paint" covers a wide variety of coatings and finishes. In heat-resistant coatings, silicone resins may be used for the paint vehicle, or may be blended with various organic resins. The silicone content may be varied in each formulation to give optimum heat or weathering properties.

The trend to light-colored, natural-finished furniture has created a demand for home heaters that complement such furniture. To meet this demand a number of leading space heater manufacturers now offer light, pastel colored coatings on their products. Such coatings have been achieved by the use of silicone-based finishes. A modified silicone aluminum coating has also been applied to the combustion chamber of home heaters, which eliminates the smoking of heat chambers when they are first fired in the user's home. Another volume application of the use of silicone finishes is in the new type and popular home incinerators.

Silicone resins are also used in many special coating applications as additives. Some of the more important and new uses are:

1. To speed grinding in difficult formulations.
2. To improve scuff resistance of lacquers.
3. To improve water resistance of electrical dioping varnishes.
4. To improve heat and moisture resistance of abrasive bonding resins.
5. To improve the adhesion of calking compounds to glass.
6. To improve the heat resistance of lamp basing cements.
7. To improve the moisture resistance of resistor coatings.
8. To improve the heat resistance of rotogravure inks.
9. As an additive in flame retardant paint.
10. To retard bubbling urethane varnishes.

Another very important use of silicones is in the use of silicone fluids in formulation of polishes. This has made possible the development of polishes that are much easier to apply and rub out, yet produce a brighter, richer and longer lasting gloss. Most modern polishes now contain this silicone fluid; such as car, furniture, chrome, glass, and metal polishes. They buff up to a high gloss with minimum effort to form a smooth, continuous film. This film is highly resistant to water, chemical attack, and has a dry and slick rather than an oily feel.

When applied to masonry — stone, brick, cast stone, concrete, cinder block — walls, silicones form a one-way street for water: they keep rain water from penetrating, yet let inside moisture out.

Architects, builders, building owners, home owners, and managers are discovering the supreme importance of this new product — the first lasting effective water repellent ever available for the treatment and preservation of above-grade (ground) masonry.

This material may be applied even by the "do-it-yourself" man. Spray equipment, if wanted, can usually be rented from your paint dealer. However, for a job on older buildings where cleaning and repairing is required before application, one should secure trained help.

The use of silicones in the cosmetic and pharmaceutical industries has now become well established. In skin preparations such as hand creams and lotions, for example, the silicone fluids provide water repellency and protection to the skin by resisting water borne irritants. Silicone fluids remain on the surface of the skin, providing an "invisible glove," but still allowing the skin to "breathe." Other uses include hair grooming preparations, lengthening the life of sun tan lotions, chapped-lip and lip stick formulations, preshave liquids, face and baby powders, special hand care applications, and in bases for ointments, etc.

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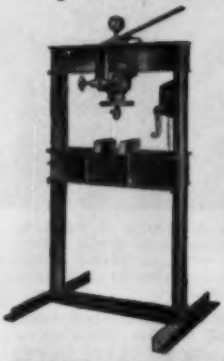

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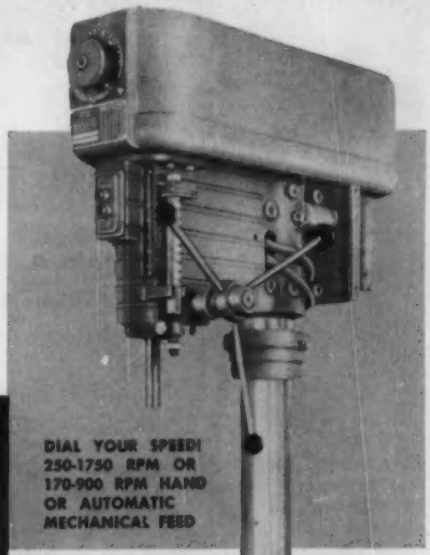

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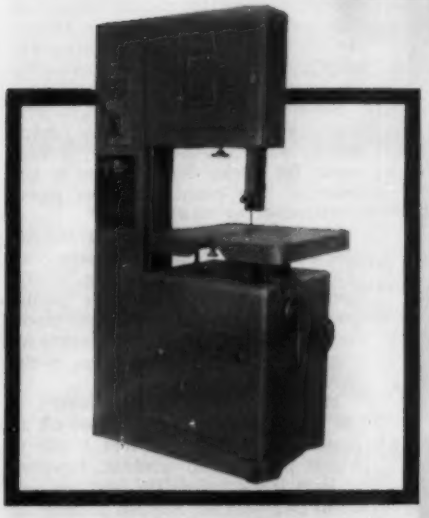

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▶ on the Ford IAA program —

Projects, Prizes — and Pride

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Educational Affairs Representative

Ford Motor Company, Dearborn, Mich.

When Bill Saenger entered Ford Motor Company's Industrial Arts Awards program in 1955, he naturally looked forward to the possibility of winning a prize, hopefully a top award. He got one. An Outstanding Achievement Award for his mechanical drawing of a Mercedes-Benz automobile.

But he didn't expect what happened next. Officials of the Daimler-Benz Company, makers of the Mercedes, got wind of Bill's work and asked to see his drawing. They were so impressed that they invited Saenger to spend two years with the home company in Germany, where he would train in the body design department.

Today Bill Saenger, after his exhilarating experience abroad, is back in this country working as an engineering illustrator for the Hiller Aircraft Company in California. He is well on his way to a successful career in his chosen field.

Bill Saenger's experience as an Industrial Arts Awards winner is probably unique. But there are many, many examples of how young men and women have profitted from their participation in the IAA.

True, many of the fine young craftsmen who have entered the IAA program might have done just as well had there been no such activity open to them. With his special skill and ability, Bill Saenger undoubtedly would have gone on to a successful career.

Above: Dr. Michael Ference, Jr., executive director of Ford's Scientific Laboratory, presents a 1959 award. Right: a student and his prize-winning bread front. Below: three judges evaluate a telescope project.

IAA: A Practical Way

"But the fact remains that the IAA has noticeably helped our students in a very practical way," says Ronald B. Thomas, supervisor of Vocational Education in West Virginia." It has stimulated them to do their very best — and it has resulted in attention which in many cases has brought important career assignments."

And this is precisely what Ford Motor Company hoped the program would do when the company took over the IAA in 1950. (IAA had been started two years before by Scholastic Magazines.) Like most modern companies, Ford was interested in broadening its services to education and the IAA seemed a "natural" for this purpose.

The Program Today

The program now offers $50,000 in cash prizes, ranging from $20 to $100 awards. Top 32 winners are brought to Dearborn for a winner's holiday. Awards are offered in 14 different categories, ranging from architectural drawing to woodworking.

Since the IAA is a specialized program, Ford Motor Company draws heavily on a national council of educators for advice and direction in the program. The council includes representatives from each state.

Since assuming sponsorship of the program, Ford Motor Company can point to the fact that more than 300,000 young men and women have participated. In addition, hundreds of teachers of industrial arts and vocational education have involved themselves in the IAA.

The number of projects entered in the IAA finals has now leveled off to about 4500 each year. From 35,000 to 40,000 projects are screened, however, at local levels before the best are sent on to Dearborn for national judging.

Forty states plus Puerto Rico, the District of Columbia, and Ontario, Canada participated in the 1959 Awards.

One of the most gratifying signs of progress resulting from the IAA is the steady increase in the quality of projects entered in the national competition over the years. Veteran Ford staffers, as well as teachers, have commented on this aspect of growth.

"The Industrial Arts Awards cannot take credit for this increase in quality."

(Concluded on page 28)

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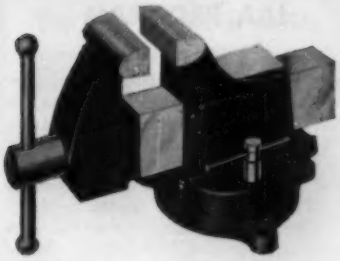
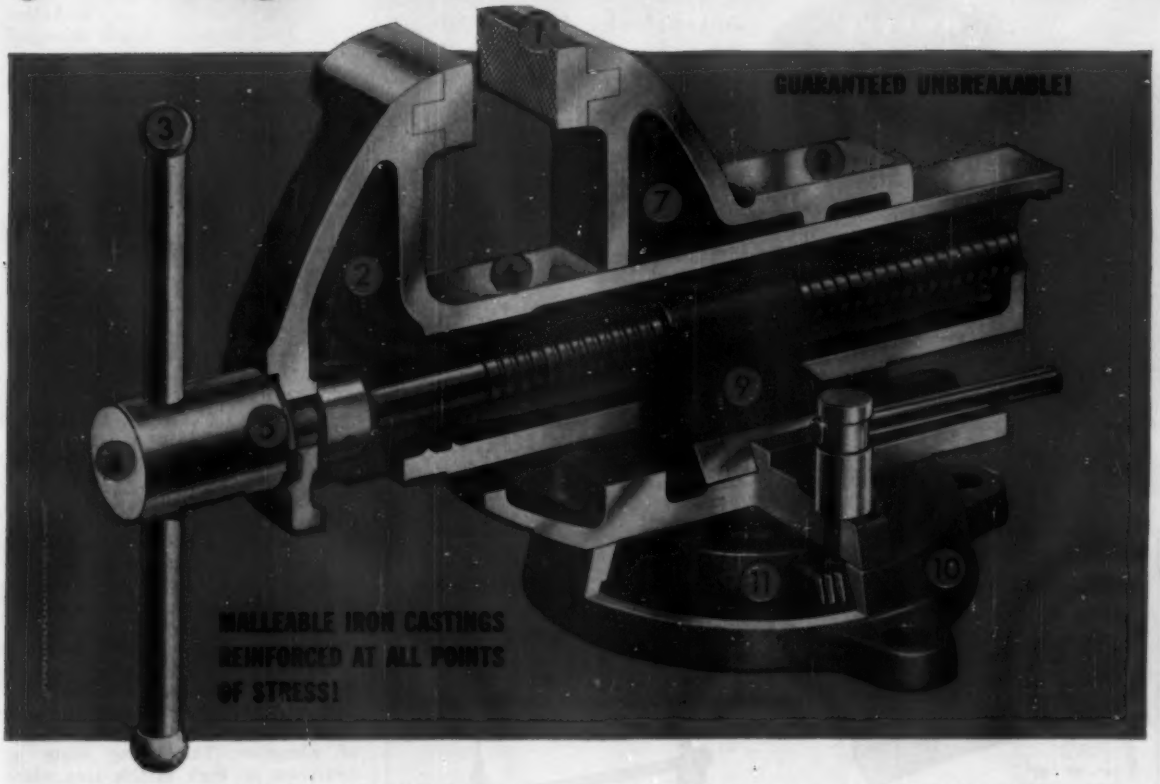


COLUMBIAN MACHINISTS' VISES



1. "T" section hardened tool steel faces pinned to jaw. Easily replaceable.
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8. Large ground and polished anvil.
9. Precision-machined nut and back jaw keyway guarantee positive alignment.
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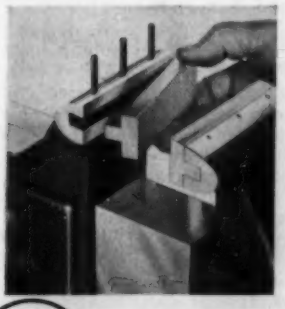
11. Forged steel, tapered-gear lock bolt prevents slippage.



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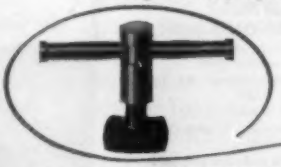

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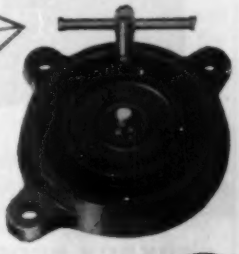

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IAA PROGRAM

(Concluded from page 26)

says Michael Radock, manager of educational affairs for Ford. "Rather, it speaks well of the upgrading of instruction in the industrial arts field. But we like to think that the IAA program has made some contribution to this growth by stimulating interest in the field."

Cletus G. Moloney, industrial arts consultant for the Philadelphia Public Schools, says industrial arts education in the Philadelphia area has improved greatly in the past few years. "We all feel that the Industrial Arts Awards has helped to make this progress possible."

The Development of Fairs

The development of a network of Student Craftsman's Fairs is another gratifying offshoot of the IAA program. The Fairs are the local, state, and regional arms of the IAA. Students enter projects in these fairs in hopes they will be judged satisfactory for national competition. In 1959 alone, 60 Craftsman's Fairs were conducted in 32 states. Some 40,000 projects were entered in the expositions. Approximately 3000 schools participated.

More than that, the Fairs provide a constructive outlet for creative hands and minds. Perhaps this should have been first on our list.

Fairs were conducted at city, sectional and state levels.

The growth of fairs is important for several reasons. First and foremost, of course, is that they result in much-deserved recognition for individual students where it counts most — in their home towns, where many will seek employment and will make their homes. Second, and of importance to the industrial arts field, these local fairs create a better climate for this important phase of education. They bring about an awareness of work in this area which pays off when the industrial arts supervisor goes before his principal, superintendent or school board for needed equipment and facilities.

The educational affairs staff at Ford Motor Company is constantly seeking new ways to make the IAA program, as well as its other educational programs, more effective and more meaningful.

In 1960, for example, a new category for solar energy devices is being added to the program on an experimental basis. It is hoped that students will make a worthwhile contribution to the development of projects which use the sun's energy for their operation. There is a desperate need for new sources of power and energy in many underdeveloped parts of the world.

The Industrial Arts Awards program is one of a number of activities carried out by Ford Motor Company as a service to education. For the company, the program means good will and respect. Ford is naturally concerned with putting its best foot forward in supporting worthwhile educational endeavors.

David Huttner

Quinton Meek

Robert Kintz

Fred Plonsky

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One of these experts works for you

One of the five Delta School Representatives pictured above is on your staff right now! His primary job is to assist and work with you in any phase of your industrial arts and vocational education program. Because he contacts many shop instructors, administrators, and school architects he can bring you the benefits of the latest thinking, techniques and developments. And because his background includes actual teaching experience, he recognizes and understands *your* needs. So whether you are designing a new shop, selecting additional equipment, or increasing the efficiency of your layout, you can count on his expert help.

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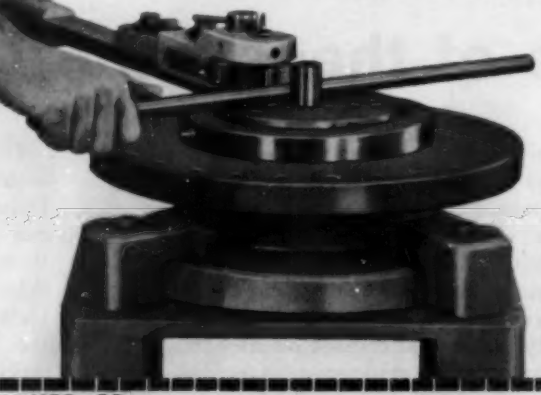

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help on equipment selection

"Getting More Value for Your School Dollar" contains recommendations to help "educational authorities and/or architects procure only the most suitable equipment, from the standpoint of efficiency and cost, for their schools."

Intended primarily for board members and superintendents, the 8-page leaflet suggests that all "fixed" equipment — which would include industrial arts machinery — should be left to school authorities and school architects. In doing so, it contains hints on prequalification of bids, allowances, specific alternatives, and pre-filed sub bids which, if followed, should result in more i-a equipment for less cost.

Something to read and tell your administrators about.

Write the School Facilities Council at 257 Fourth Avenue, Mount Vernon, N. Y., for your free copy of "Getting More Value for Your School Dollar."

data on apprenticeship

Published jointly by the Office of Education and the Bureau of Apprenticeship and Training of the U. S. Department of Labor, "Careers in Apprenticeship" is a ten-page leaflet for high school pupils, and industrial educators, and counselors. It briefly describes the basic thoughts on modern apprenticeship.

Included are a definition, preparation, application, qualifications, apprenticeable trades, and advantages. Also valuable are a listing of "where to go for additional information" and a bibliography of "additional readings" on the subject.

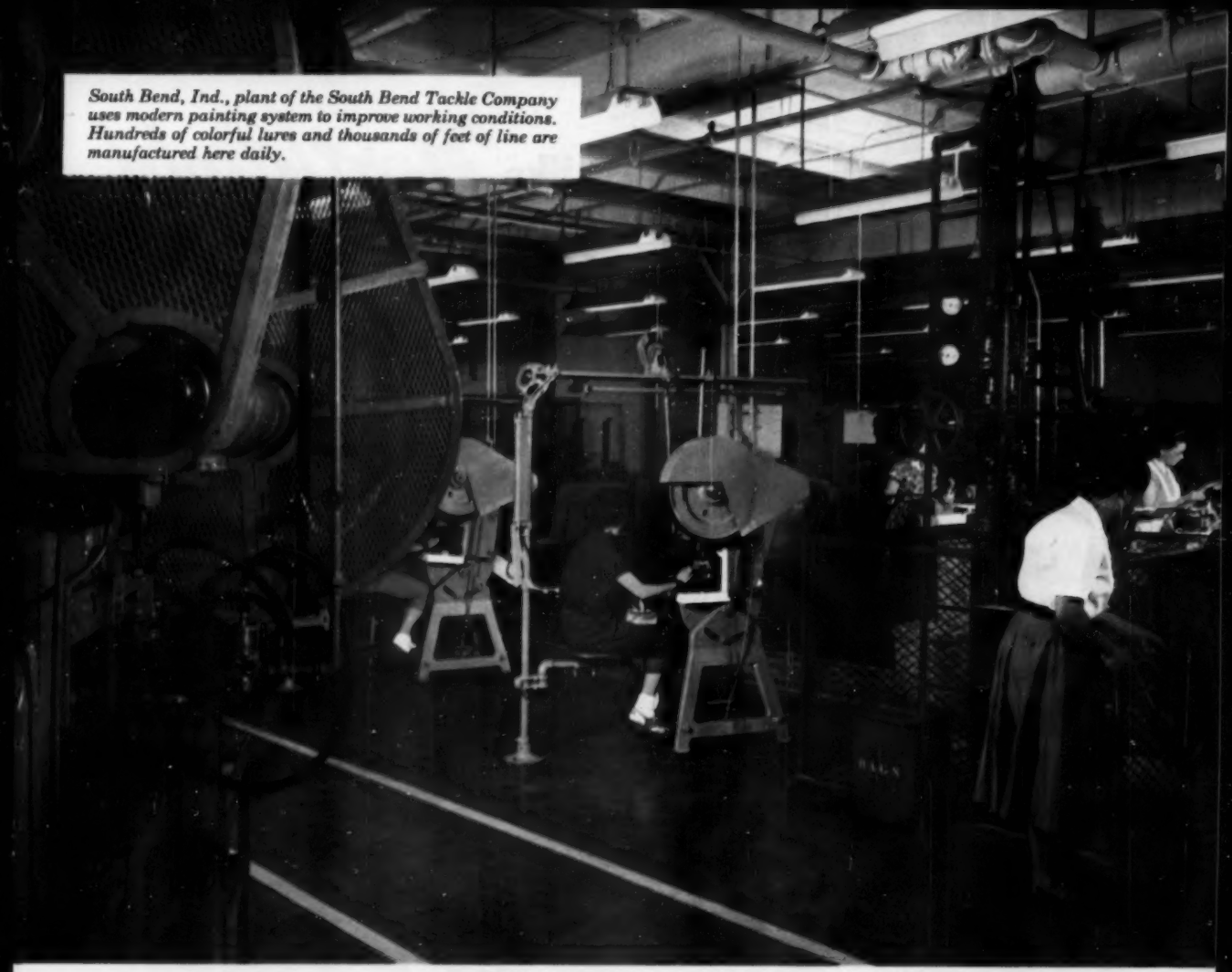
Write the Division of Public Documents, U. S. Government Printing Office, Washington 25, D. C., for your copy of "Careers in Apprenticeship."

a chart on nails

Offered free to readers of IA/VE is a 9½ by 16-in. cardboard, two-color nail chart, illustrating 44 types of nails. In addition to showing the different styles, from finishing to smooth box to cement coated to various types of staples, the board also illustrates common nails in their exact size, from 2 penny through 60 penny.

An excellent visual aid for students in woodworking and crafts.

For your free copy of the chart, write Advertising Department, Northwestern Steel and Wire Company, Sterling, Ill.



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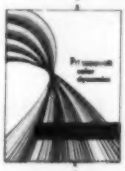

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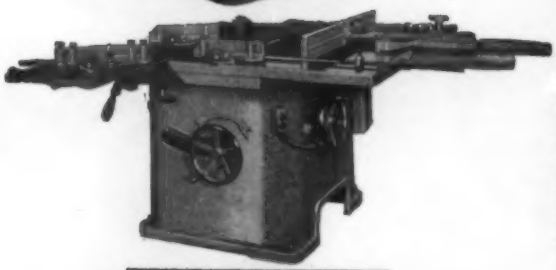

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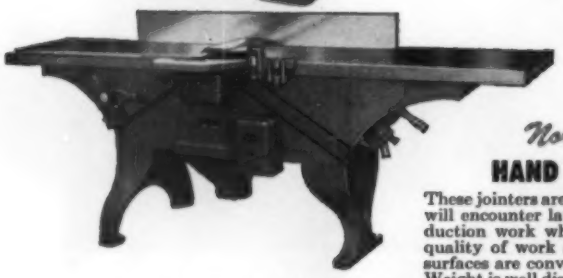
The NORTHFIELD No. 4 Variety Saw is a carefully designed, quality machine with the latest features. It offers maximum versatility for all around sawing in any school shop. In addition to wood it's adaptable for cutting light metals, plastics, and other materials. The table on the basic machine is 44" x 36", plus a 19½" extension for carrying the rip gauge table. One or more 12" table extensions can be furnished to increase table size. A rolling section table is also available. You'll like this machine for its versatility, heavy duty capacity, ease of handling, and speed with precision.



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These jointers are of the type the student will encounter later being used for production work where accuracy and fine quality of work are essential. Working surfaces are convenient to the operator. Weight is well distributed to make a well balanced smooth operating machine. The medium duty machine at right is available in eight and twelve inch widths. Tables are 6'2" long; rabbet depth ⅜". Heavy duty jointers are available in 12" and 16" sizes. Tables are 8' long; rabbet depth ½". They use a round three or four knife, safety type cylinder head, and a three horsepower, 3600 R.P.M. T.E.F.C. motor; five H.P. motors and belt drive machines also available.

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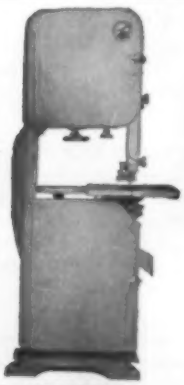

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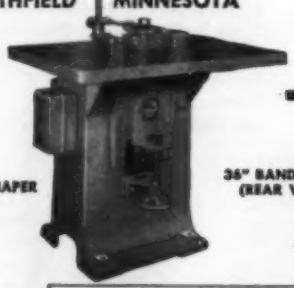

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36" BANDSAW (REAR VIEW)

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are ideal for school shops. They have simplified, high performance, trouble-free, mechanical design. They are available in 18" x 8" and 24" x 6" sizes.

Manufacturers of High Speed Precision Heavy Duty Woodworking Equipment

(For more information from advertisers, use the postcard on page 155)

FOUR BARE WALLS ARE NOT ENOUGH

What kinds of shops will we see in the thousands of new high schools to be built during the golden '60's? Will they be, as has so often been true in the past, *just four bare walls?*

All of us agree that an educationally correct shop is essential to good teaching. Industrial education deals with *things* and as teachers we need things such as tools, machines, benches, cabinets, and materials in order to teach. Ours is "learning by doing," but students can't *do* without the necessary physical facilities.

During the past decades many new school buildings were planned, built, and equipped with little thought for shop facilities. All too often, when a new high school was built, the shop got the short end of the educational stick. Because many administrators are academically minded, the areas of English, mathematics, science, art, music, and library were usually well designed and equipped. Also, the citizens of most communities demand the best for the school auditorium and for physical education — "Our town must have the largest gym in the county." The home-economics rooms must be completely equipped because everyone realizes that the home economics teacher needs such things as sewing facilities, unit kitchens, dressing rooms, and grooming areas to carry on an excellent family-living program.

But what about the shops? "Oh, yes, we must have some, so let's provide space in the plans." What about equipment? "Oh, let's not worry about that. We'll let the new shop teacher order the equipment after he arrives on the job. Maybe he could even build his own benches and cabinets. After all, he's a woodworking teacher, isn't he?" So the building is planned and equipped for all areas except the shops. Industrial education gets only four bare walls.

By the time the school is dedicated, the community has usually run out of money and there is nothing left for the shop equipment. This is the time the superintendent suggests to the new shop teacher that he get along with the "junk" that they used in the old shop. And so the sad tale ends for industrial arts in many new school buildings. Usually one or two areas stand idle because of the lack of equipment and the other areas are equipped with 1910 benches, tools, and machines.

While this is bad enough, many basic architectural errors that cannot be corrected are made in the shops. Here are a few illustrations found in new shops and schools your editor visited within the last year:

1. A junior high school building in which all the electrical outlets in the shop (12 convenience outlets) were clustered in one corner of the shop. It's cheaper to wire them that way, you know.
2. A new general shop with soldering and heat-treating equipment provided but with no gas line in or near the shop for hooking them up.
3. A new general metals shop with a large circular washing sink "smack dab" in the center of the shop area. This, incidentally, was the *only* built-in feature in the entire shop.
4. A woodworking shop with a beautiful dust-removal system located in a special room but with no duct work or electrical circuits for hooking it up. The chances of getting either are mighty slim because the location is such that hooking it up would make it too noisy for the rest of the school activities.
5. A new general shop with one auxiliary room for lumber storage. The only difficulty was that the door was on the side and not on the end so the only thing you could store in it was rubber lumber.

How can we make sure that the shops built in the *next* decade will be architecturally and educationally correct and that equipment will be an integral part of each of the new shops? Here are some suggestions that we should consider:

1. The members of our profession should work closely with school architects in order that they will be acquainted with the needs of our area of education. How many architects, for example, know what a power mechanics shop is and should be?
2. We should convince administrators and architects that shops must be completely equipped with tools, machines, benches, and cabinets. The new shop teacher should not be expected to set up benches and install equipment. Anyone who has tried to mount tools on a board realizes that this alone would take all of the spare time of a teacher for a full year.
3. We should convince superintendents that the shop teacher is hired to teach, not to build the shop equipment.
4. Every state should have available a consultant service at the state level so that small and medium-sized towns can obtain expert advice as to the kinds and types of shops that best suit their particular communities.
5. The job of planning industrial arts facilities should be the responsibility of the industrial arts teacher or teachers. All too often, however, plans for the new building are completed and the building well along towards completion before the teacher is hired. Since the basic offerings of industrial arts are the same regardless of geographic location, every state should have available suggested floor plans that can be used by those who design new school buildings.
6. Industrial arts teachers must get over the idea that shop equipment and benches can be moved around to suit personal tastes. The location of necessary utilities such as gas, air, and electricity determine the specific location of benches, machines, and other items.
7. We should seek the advice of commercial concerns in selecting benches and equipment but we should not turn the job of school shop planning over to any single company. We should use standard-brand, high-quality benches, cabinets, and equipment and we should buy from companies that are interested in education. In ordering new equipment, commercial concerns that advertise in professional journals should be given first consideration. The idea of buying off-brand items for which replacement parts and services are difficult to get should be discontinued.

Industrial education depends on good *teachers*, good *students* and good *physical facilities*. Let's make sure we have all three. ◀

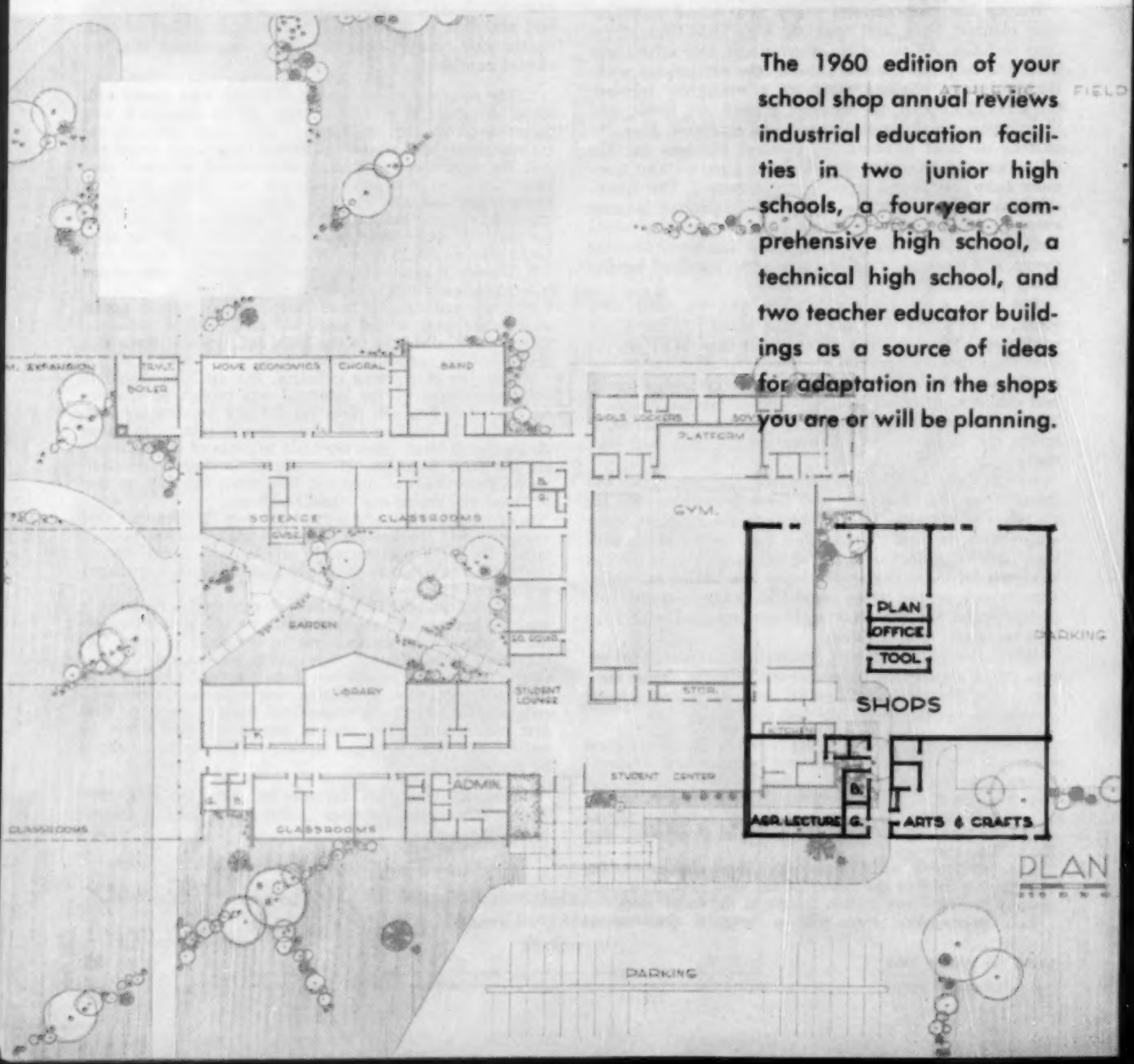
John L. Feirer

1960

shop planning

— Oxford, Mich., Schools

The 1960 edition of your school shop annual reviews industrial education facilities in two junior high schools, a four-year comprehensive high school, a technical high school, and two teacher educator buildings as a source of ideas for adaptation in the shops you are or will be planning.



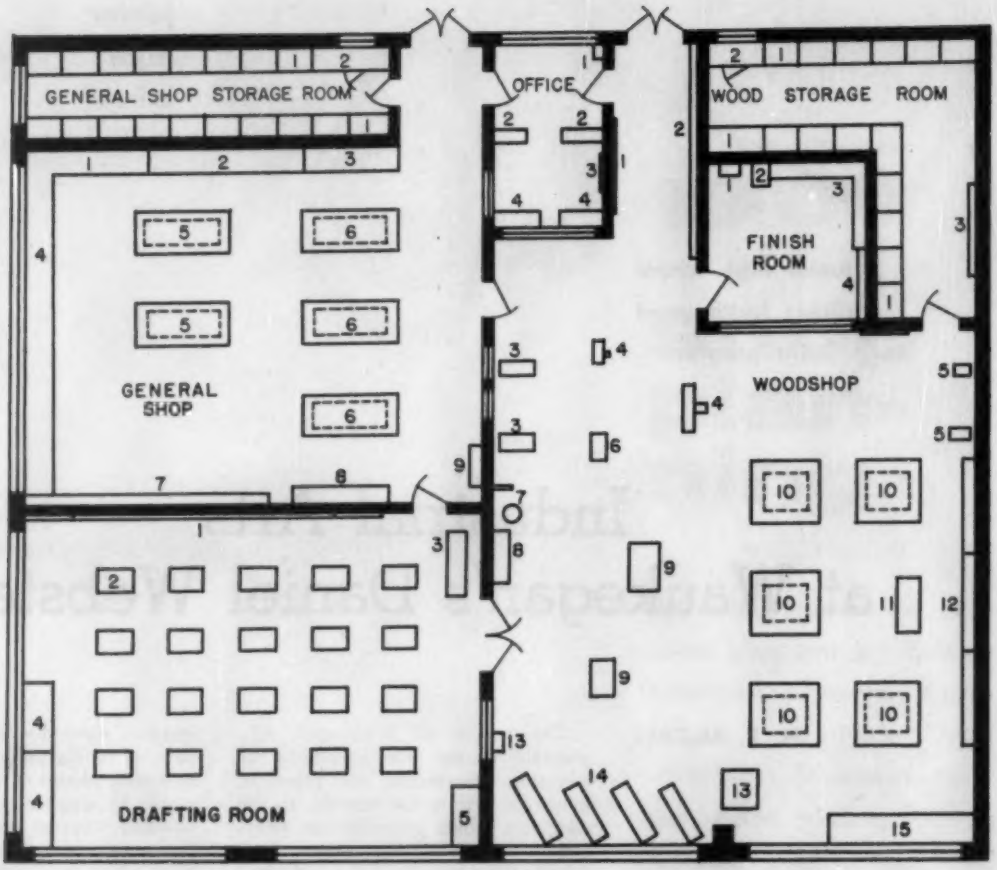
▶ junior high school facilities for a good i-a program —

Industrial Arts at Waukegan's Daniel Webster

H. R. McCALL

The people of Waukegan, Ill., generally accept the philosophy of educators concerning the place of industrial arts in our schools. In the campaign which preceded the referendum to build our junior high schools three years ago, detailed plans of the proposed building and educational programs were given widespread publicity. The public was as informed as it could possibly be with all facets of the program. The proposed industrial arts facilities, because of their relatively expensive features, naturally came under closer scrutiny by the public than other less expensive phases of the building program. Although some phases of the building program were questioned at times, criticism directed at the proposed industrial arts program was

Mr. McCall is superintendent of schools of the Waukegan, Ill., City School District No. 61.



Office: 1. coat rack; 2. files; 3. tack board; 4. desks. **Wood Storage Room:** 1. shelves; 2. display case; 3. bar clamps. **Woodshop:** 1. bulletin board; 2. coat and book rack; 3. jig saw; 4. jointer; 5. drill press; 6. band saw; 7. brooms and basket; 8. sink; 9. circular saw; 10. workbenches; 11. instrument bench; 12. tool racks and cabinets; 13. grinder; 14. lathes; 15. glue table. **Finish Room:** 1. sink; 2. spray booth; 3. finish bench; 4. metal cabinet. **General Shop Storage Room:** 1. shelves; 2. display case. **General Shop:** 1. tool storage; 2. furnaces; 3. drill press; 4. 10 working stations; 5. machine bench; 6. bench; 7. coat and book rack; 8. leather tools; 9. sink. **Drafting Room:** 1. bulletin and blackboards; 2. drawing tables; 3. bench; 4. storage; 5. table.

significantly nonexistent; the referendum passed without serious opposition. As a result, Waukegan has in both its junior high schools adequate space, equipment, and other facilities to enable it to conduct a good industrial arts program.

Objectives of the I-A Program

The objectives of the industrial arts program for boys are similar in many respects as they are for all areas of the curriculum. Emphasis is in the direction of worthwhile activities, attitudes, habits, understandings, and interest in creative experiences. The boys become familiar with the various tools and machines with which they must work, their uses, how to care for them, and to respect them with reference to their own personal safety. They are also brought into contact with materials, products, and processes of the trades and given some insight into the characteristics of the occupations associated with the industrial arts program.

An important objective of the junior high school industrial arts program, of course, is to prepare students for the high school industrial arts program. Both units — junior high school and senior high school industrial arts departments — are constantly at work in the articulation of the two programs.

The industrial arts program at Daniel Webster junior high school provides for one double period per week (90 minutes) for the seventh-grade boys. Eighth-grade boys have two periods per week — one double period and one single period (135 minutes). The seventh-grade program is as follows: (1) woodshop, 18 weeks; (2) drafting, 9 weeks; and (3) sheet metal, 9 weeks.

Plastics and leathercraft are offered during the activity period. The activity period is a 45-minute period at the end of the day in which time the students may select as many as two of the many activities which are offered. This period is also open to girls.

Eighth-grade boys participate in:

The drafting room at Daniel Webster

Leathercraft students working in the school's general shop

(1) electricity, 12 weeks; (2) woodshop, 12 weeks; and (3) drafting, 12 weeks.

Plastics, leathercraft, and sheet metal are offered during the activity period.

The instructors use various teaching techniques in their work; lectures, illustrations, and demonstrations are all utilized. Teaching aids such as charts, models, drawings, samples, and visual aids (many from our own visual aids department) have proved very effective. Students are required to develop a notebook, which includes information sheets, job sheets, project sheets, plan sheets, and examinations. They are also encouraged to give oral and written reports.

A Popular Program

The industrial arts program is popular with boys. The urge to work with their hands and with machines and tools and the satisfaction of concrete evidence of their creative efforts in the form of a finished project help to make this one of the most enjoyable phases of the junior high school curriculum. ◀

Discussing power tools in the woodshop

general metals shop

woodwork and drafting shop

handicrafts and printing shop

▶ what's new in Tulsa's industrial arts shops on the junior high school level is reviewed in this report of the district's Alexander Hamilton Junior High School program —

1. Display case; 2. jig saw; 3. 4 by 5-ft. four-student benches; 4. jointer; 5. wood lathe; 6. band saw; 7. drill press; 8. oilstone tool grinder and pedestal 10-in grinder; 9. finish bench; 10. deep sink; 11. spray booth; 12. glue bench; 13. wash sink; 14. table saw; 15. drinking fountain; 16. student project lockers; 17. tool panel; 18. supply storage; 19. teacher's desk; 20. planning unit; 21. tablet arm chairs; 22. display shelf; 23. buffer bench; 24. utility sink; 25. spray booth; 26. paper cutter; 27. pilot presses; 28. 8 by 12-in. platen press; 29. imposing table; 30. type cabinets; 31. first aid cabinet; 32. proof press; 33. supply cabinets and display; 34. 3 by 10-ft. benches; 35. engine lathes; 36. spray booth; 37. foundry area; 38. anvils; 39. melting furnace; 40. gas forges; 41. turbo-jet blower for forges; 42. welding table; 43. welding booth; 44. a.c. welder; 45. power hack saw; 46. soldering furnaces and bench; 47. squaring shear; 48. electrical test bench; 49. sheet metal bench; 50. metal cutting band saw.

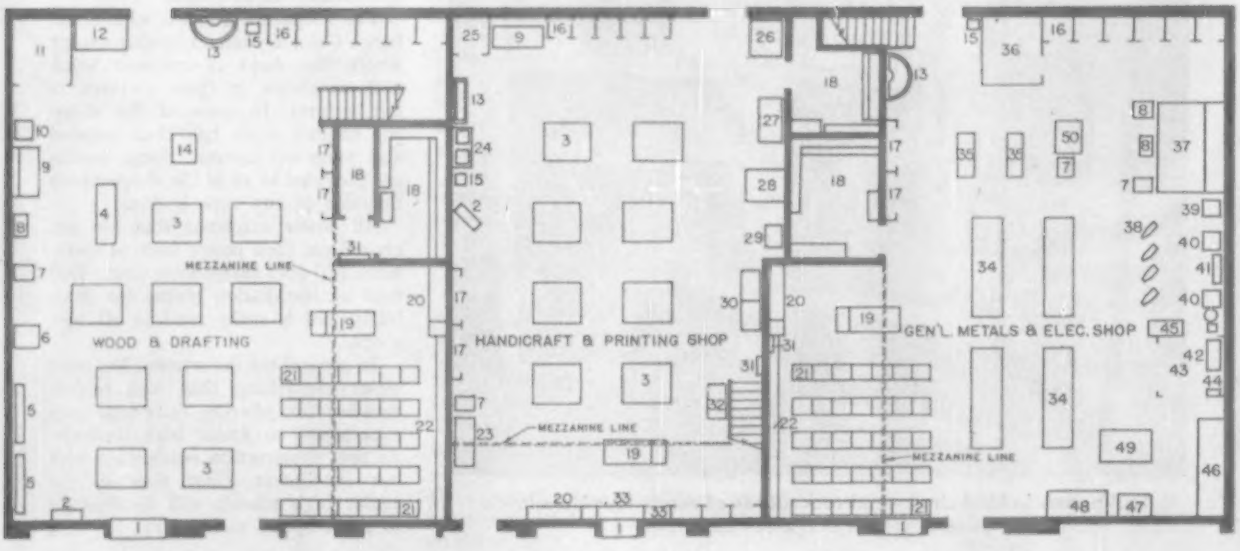
Facilities for Industrial Arts in Tulsa

M. J. RULEY

Tulsa, one of the fast growing cities of the Southwest, has conducted an extensive building program for the past ten years. Enrollment in the public school system last year totaled 61,938 students, with 39,789 enrolled in 58 elementary schools, 12,400 in 13 junior high schools, and 9749 in 5 senior high schools. Two more junior high schools and 2 senior high schools were opened in September, 1959. Land has been purchased and planning is under way for additional junior high schools until there will be a total of 19 by 1960 or 1961.

Mr. Ruley is supervisor of industrial arts and vocational education for the Tulsa, Okla., schools.

Over the years industrial arts has been a required subject in the seventh and eighth grades and an elective in the ninth grade. However, in many of our new schools, because of larger enrollments than were anticipated, facilities are not available to make it possible for all eighth-grade students to take industrial arts or home making. The facilities provided for industrial arts courses in the junior high schools will be outlined in this article. They consist of a shop for drawing and woodwork, another for general metals and elementary electricity, and one for handicrafts and elementary printing.



Planned Facilities

Facilities at the Alexander Hamilton Junior High School are described in this article. This building, designed to accommodate 1250 students, has three industrial arts shops as previously mentioned.

The initial planning of industrial arts facilities in the junior high school was done by the teachers of the junior high schools, with a smaller committee working with the supervisor on final details. All of the details for good shop planning were taken into consideration as plans were made. The suggested plans were then presented to the director of school planning of the Tulsa schools and the architect. Details of all storage facilities, cabinets, racks, tool cabinets, etc., were developed by the department and were given to the architects who in turn included them in the detailed plans. This arrangement has been a help to both the architect and the schools in getting the type of facilities planned by industrial arts personnel.

Over-all dimensions of the shops shown, including storage facilities, are as follows: woodwork and drawing, 44 by 50 ft.; handicrafts and printing, 32 by 50 ft.; metals and electricity, 45 by 50 ft. Balcony space of 11 by 40 ft., approximately, is not included in the dimensions listed. The balcony space is over the supply rooms and class area.

In the drawing and woodwork shop, and in the handicrafts and printing shop, 48 by 60 in. four-student benches are used with cross rails set in so stools may be stored under the bench out of the way. This is necessary because a nine-week drawing and planning course is offered to all seventh graders in the shop. During the second nine weeks, woodwork is taught to these same students in the drawing and woodwork shop. When elementary printing is taught in the handicrafts and printing shop, fixtures have been made that will fit on the benches for holding type cases. These shops are all equipped to handle 32 students, and in some cases as many as 36 students in a class will be at work.

In the general metals and electricity shop, a semester of general metals is given to the seventh graders while those in the eighth grade getting nine weeks of additional metals and nine weeks of elementary electricity. An electric panel with a.c.-d.c. rectifier units is provided in this shop. Electric welders have been added in the junior high schools and will be used in the eighth grade and in the elective ninth grade metal course. Bench metal, sheet metal, ornamental iron are taught in the seventh grade, and in the eighth grade, more advanced metal work in the areas listed with added experience in foundry and elementary machine work.

Classroom and Storage Areas

Tools are stored in a cabinet with sliding doors which are also used as chalk boards and tack boards. Supplies are stored in a supply room with cabinets and adjustable shelving, using the balcony for storage of lumber, steel and large projects which will not fit into the project lockers. In each of the shops, six or seven project lockers, 30 in. deep, 36 in. wide, and 6 ft. 6 in. high, with adjustable shelving, are provided for storage of student projects.

The woodwork shop has a storage room for storing lumber shorts and scraps. This saves student traffic to the balcony for lumber.

The class and planning area, used for class discussions and demonstrations, has tablet arm chairs, chalk board, teacher's desk, and a library cabinet. Visual aids are also used in this area and have proved very satisfactory.

Other Specifications

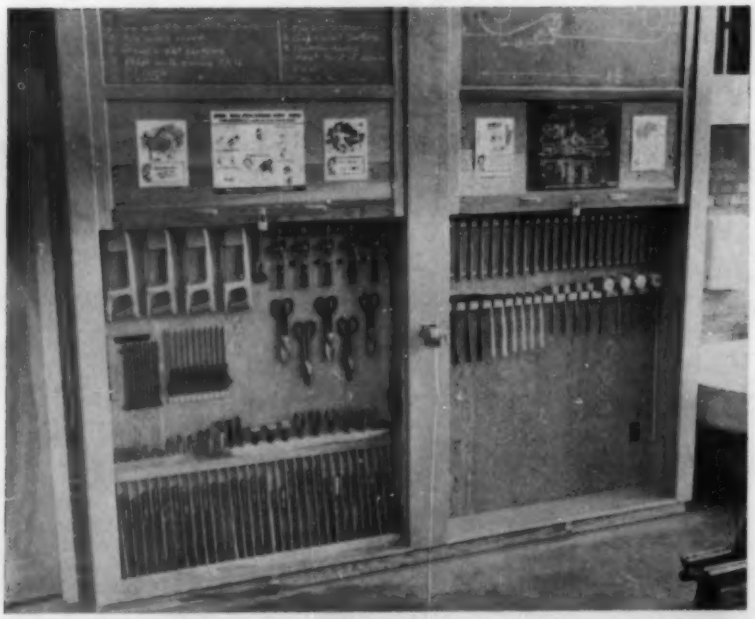
Display cases for each shop front on the corridor and provide a means of displaying projects and offerings in that particular shop. Tack boards are distributed through each shop for use in displaying safety posters, prints, etc.

The floors in the woodwork and drawing shop and the handicrafts and printing shop, are wood blocks, with concrete used in the metals and electricity shop. The ceilings are acoustically treated, and artificial lighting provides uniform high level illumination in all areas.

The shops are finished with Pittsburgh Color Dynamics System except where the dado is common brick and, as shown in these pictures, is left natural. In some of the shops the cabinet work has been painted and some left natural. Spray booths are provided in all of the shops where finishing of any type is done.

All power machines that are anchored get their power from an overhead 220-60-3 phase buss duct. This type of installation makes for flexibility and is being used in all new shops.

In general the department has been given everything that was recommended for offering industrial arts experiences to junior high students. As new construction catches up with our enrollment, class sizes in the junior high schools will be directed to a staff-pupil ratio of 27.



Tool panels behind chalk- and tackboards of Alexander Hamilton's general metals and electricity shop.

▶ the industrial education department of a four-year secondary plant with facilities in vo-ag, trades and industry, and industrial arts —

Industrial Education at Missoula County

BENJAMIN A. ULMER

The industrial education department of the Missoula County High School consists of three sections: vocational agriculture, trades and industrial education, and industrial arts education.

For administrative reasons and purposes these three sections are placed under one head called the department chairman. Although the philosophies of these three types of fields differ somewhat, placing them under one chairman has resulted in better co-ordination between the courses. The three fields also seem to complement each other resulting in a stronger program in each area. The result has been more purposeful industrial and agricultural education due to the co-operation between the three areas, thus providing better opportunities for guidance for the students.

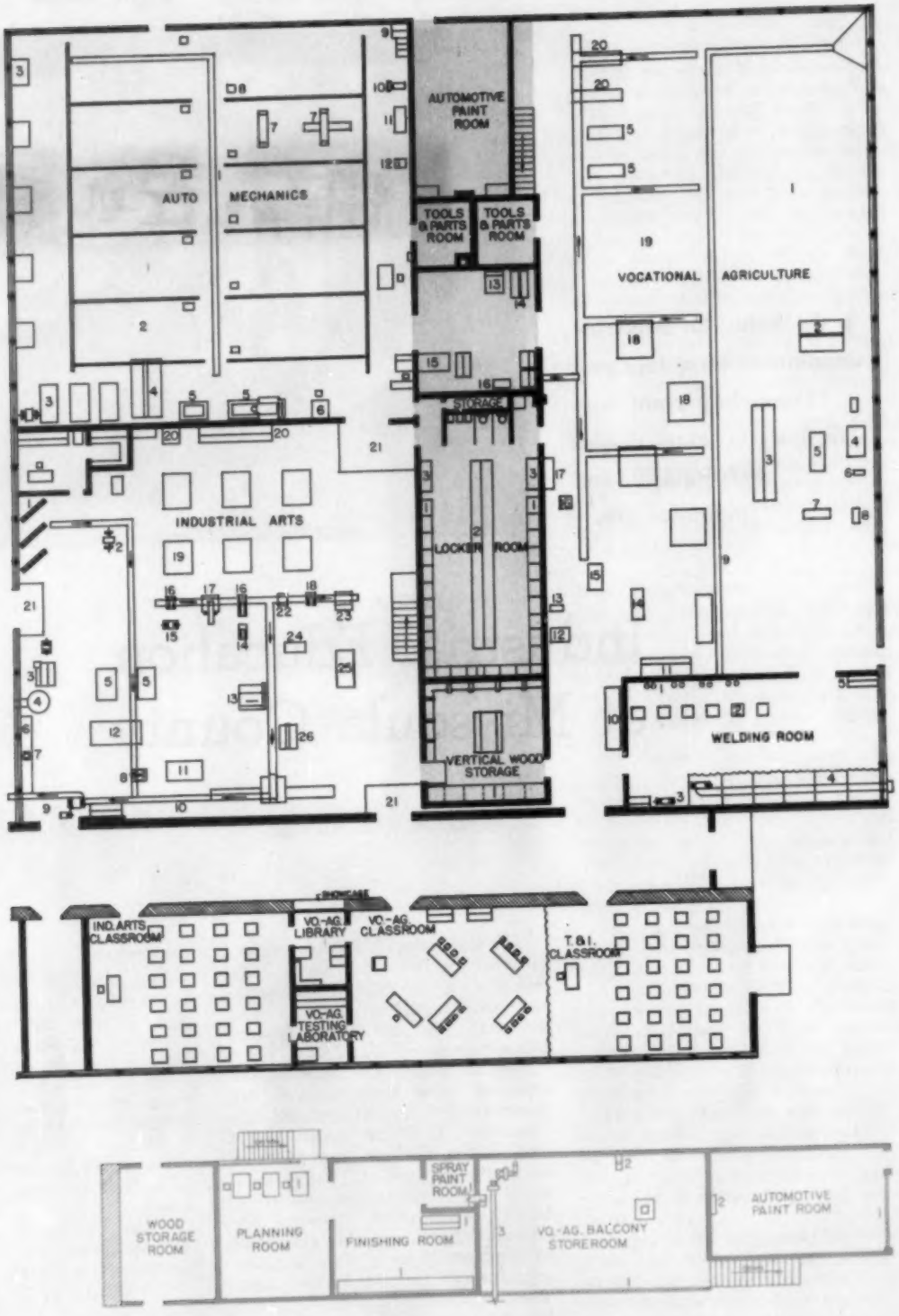
Curriculum

The industrial arts curriculum is set up under a unit general shop plan. Courses are being offered in woodcraft, metalcraft, plastics, welding, general drafting, architectural drafting, and engineering drafting. Plans are being made to add courses in machine shop and electricity and electronics.

Vocational agriculture is offered throughout the four years of high school.

Under the trades and industrial education two full years of auto mechanics are offered.

Mr. Ulmer is chairman of the industrial education department of the Missoula County, Mont., High School.


AUTO MECHANICS
AUTOMOTIVE PAINT ROOM
TOOLS & PARTS ROOM
TOOLS & PARTS ROOM
STORAGE
INDUSTRIAL ARTS
LOCKER ROOM
VERTICAL WOOD STORAGE
VOCATIONAL AGRICULTURE
WELDING ROOM
IND. ARTS CLASSROOM
VO-AG. LIBRARY
VO-AG. CLASSROOM
VO-AG. TESTING LABORATORY
T. & I. CLASSROOM
WOOD STORAGE ROOM
PLANNING ROOM
FINISHING ROOM
SPRAY PAINT ROOM
VO.-AG. BALCONY STOREROOM
AUTOMOTIVE PAINT ROOM

Auto Mechanics
1. drain
2. stalls
3. tables
4. hoist
5. engine racks
6. foreman's desk
7. post lift
8. exhaust outlets
9. lubesters
10. wheel balancer
11. wheel alignment tools
12. spark plug tester
13. forge
14. tools
15. table
16. cleaner

Industrial Arts
1. lathes
2. grinder
3. sheet-metal cutter
4. forge
5. sheet-metal-working tables
6. worktable
7. gas oven
8. metal bender
9. ramp
10. exhaust
11. metal table
12. sheet metal table
13. table saw
14. jig saw
15. buffer
16. drill press
17. band saw
18. belt sander
19. worktables
20. tools and materials
21. ramp
22. disk sander
23. shaper
24. jointer
25. table
26. planer

Locker Room
1. lockers
2. benches
3. sink

Vocational Agriculture
1. machinery repair area
2. hoist
3. metal shelves
4. lathe
5. metal table
6. drill press
7. power hack saw
8. metal grinder
9. drain
10. worktable
11. tools and material
12. band saw
13. belt sander
14. jointer
15. table saw
16. wet grinder
17. sink
18. worktables
19. large work construction area
20. wood tables

Welding
1. bottles
2. acetylene welding worktables
3. grinder
4. electric arc welding booths
5. tools

Vertical Wood Storage
1. project storage

Automotive Paint Room
1. overhead door
2. vent

Vo-Ag. Balcony Storeroom
1. railing
2. vent
3. exhaust system

Spray Paint Room
1. vent

Finishing Room
1. cabinets

Planning Room
1. drafting tables

Shops

The shops are all adjacent to each other under one high roof. The shop building is an integral part of the general high school building joined to the rest of the plant by a corridor. The building is of brick veneer, cement block construction with the upper two thirds of the wall area being windows. This provides ample lighting and ventilation. All shops have concrete seal coated floors with the exception of the industrial arts wood shop where 2-in. tongue and grooved planking has been laid over a concrete floor. Classrooms are adjacent to the shop area. The shops share such common areas as the washroom, wood storage room, and general storage rooms.

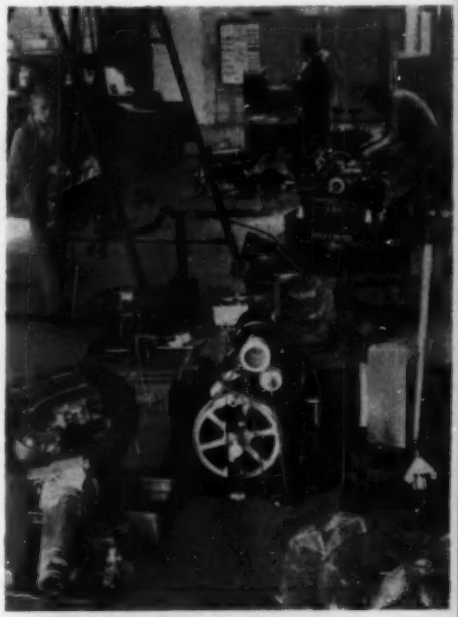
Storage

In general the shops employ the open tool cabinet or tool panel method of tool storage. The auto mechanics section as well as the vocational agriculture section uses a parts room to store as well as dispense automotive and repair parts. A separate building is provided to store inflammable materials such as gasoline, oils, etc. The vertical method of storing lumber is employed in the industrial arts lumber storage room. Unfinished projects are stored in pigeon hole type storage bins as well as in the storage area on the balcony adjacent to the planning area. Drying racks are provided in the finish room to store projects that are being finished.

Machines

Machines are of the light to medium type, modern and as close to the type used in industry as is possible to obtain for school shops. These machines are driven with motors wired to 220-volt current, three phase. Machines are all guarded to provide maximum safety for the students who use them.

The enrollment of Missoula County High School for the year 1958–59 was approximately 2000 students. The number enrolled in Industrial Education was about 500 students. Approximately 100 adults use the school shops in the evening for apprentice training in the various trades. ◀



Above: Missoula's auto mechanics shop. Below: a view of the school's vo-ag shop.

technical high school

▸ remodeled and expanded, this technical high school now provides instructional areas for widely varied core areas —

The Des Moines Technical High School

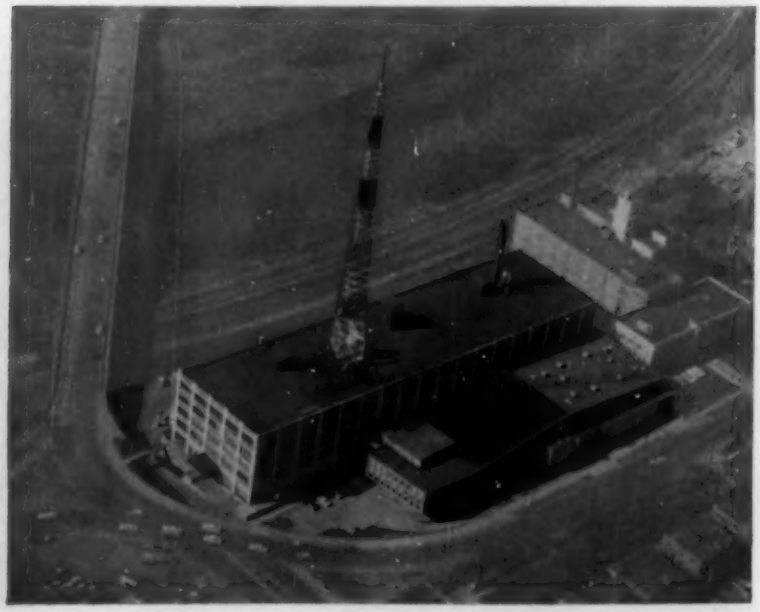
ROBERT R. DENNY

The new $5,000,000 Des Moines Technical High School is attracting visiting vocational teachers and supervisors from many states. Now in its second year of operation the staff of 84 and student body of 1440 is making excellent use of the extensive facilities in this large building.

Background of the Schools

A technical high school for Des Moines was established in 1942 in the building which was formerly

Dr. Denny is administrative assistant to the superintendent of the Des Moines, Iowa, Schools.



known as West High School. This building was an older structure — part of it constructed in 1888 and a new section in 1903. Des Moines Tech was partly an outgrowth of a program of training adults for employment in defense activities which the school system had been asked to provide. Too, it was the culmination of local plans for such an institution. The late Roy C. Woolman, director of industrial education, took an active part in the organization of the technical high school.

From 1942 until the end of World War II the high school program and the training of adult workers for industrial firms engaged in defense activities were carried on side by side. Meanwhile, the school had grown from an enrollment of less than 300 the first year to about 450. This latter enrollment figure was augmented by returning veterans seeking technical education for employment purposes. The number of veterans in training exceeded 250 at various times.

After World War II, enrollment in the technical high school grew rapidly. Over 700 were enrolled in 1948, 900 in 1952 and 1100 in 1954. From 1954–57 there was little growth in enrollment because of the limited facilities in the old building. The increased student interest in technical education and the bulge of approaching secondary enrollments were the realities that faced the board of education. The board agreed that more facilities must be provided.

Late in 1951 it was learned that the Solar Aircraft Company planned to vacate the building at 1800 Grand Avenue. This building was constructed about 1916 by the Ford Motor Company for use as an assembly plant. It was acquired by the Solar Company about 1940 for use as a plant for fabricating parts for jet engines. After much study of the many problems involved it became evident that this building would provide the space required by a growing technical school. In addition to having large floor space the building was centrally located which was a factor since the students come from every section of Des Moines.

The board of education also was faced with providing a new administrative building, a new furniture factory, a building to house the adult education department, a building for the supply department, and a central warehouse. A plan was developed to bring together at this one location the technical high school, the administrative offices of the board of education, the furniture factory, and the supply department with warehousing for the district. This plan was presented to the voters who authorized the purchase of the building in May, 1952. According to agreement it was then leased to the Solar Aircraft Company while their new plant was being built.

The construction of separate buildings for Des Moines Technical High School, administrative offices of the school district, and the furniture factory would have been costly. By consolidating many departments under one roof, the overall heating, maintenance, lighting, custodial and clerical costs have been reduced. Some of the departments now housed in the new Des Moines Tech had previously rented quarters which cost almost $10,000 annually.

Extensive Addition to Existing Building

The original building is 450 feet long, 120 feet wide, 5 stories high in front, plus a ground floor level under the entire building and a sub-basement under approximately two thirds of the building. While the original structure could be remodeled for classroom space and shop areas, an extensive addition was needed to provide an auditorium, gymnasiums, swimming pool, and other areas noted below. Thus a large addition was placed at the front of the building which houses the 2000 seat auditorium; radio and television broadcasting studios, offices and equipment; separate gyms for boys and girls and a swimming pool with spectator seating for 540.

General Assignment of Space

In the accompanying floor plans the reader may see the layout of the building. The general assignment of space in the building is as follows:

Sub-basement: Central warehousing, administration.

Ground Floor: East two thirds, shops for heavy industry such as welding, diesel, sheet metal. West one third, supply department and storage administration.

First Floor: East three fourths, Board of Education administration offices. West one fourth, dressing rooms for physical education.

Second Floor: High school offices, study hall, library, lunchroom and general classrooms.

Third Floor: Vocational classrooms for business education, art, and science.

Fourth Floor: Shops for light industry such as printing, refrigeration, drafting, and machine shop.

Fifth Floor: East two thirds, cabinetmaking, furniture factory and repair shop. West one third, additional shops for painting and decorating and radio.

What the School Offers

As pupils approach the close of their 10B semester, they need to state their choice of a field of training in order that they may concentrate their preparation on one type of work at Des Moines Technical High School. The core areas in which they may specialize are listed below:

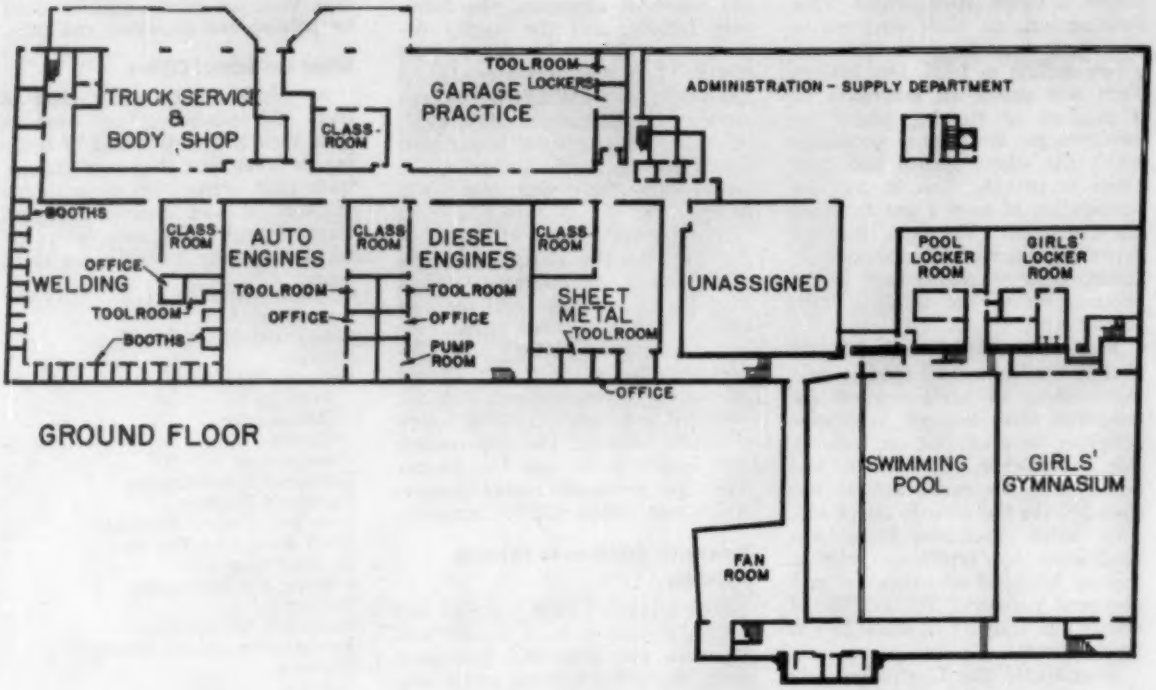
Commercial Art
Auto-Diesel Mechanics
Aviation
Business Fields
  Retailing
  Stenographic
  Clerical
  Accounting
Vocational Cabinetmaking
Vocational Drafting
Basic and General Electricity
Hotel Restaurant Practice
Machine Shop
Painting and Decorating
Printing
Radio and Electronics
Refrigeration and Air Conditioning
Tailoring
Welding
Vocational Sheet Metal
Television and Radio Program Production

Evening Adult School

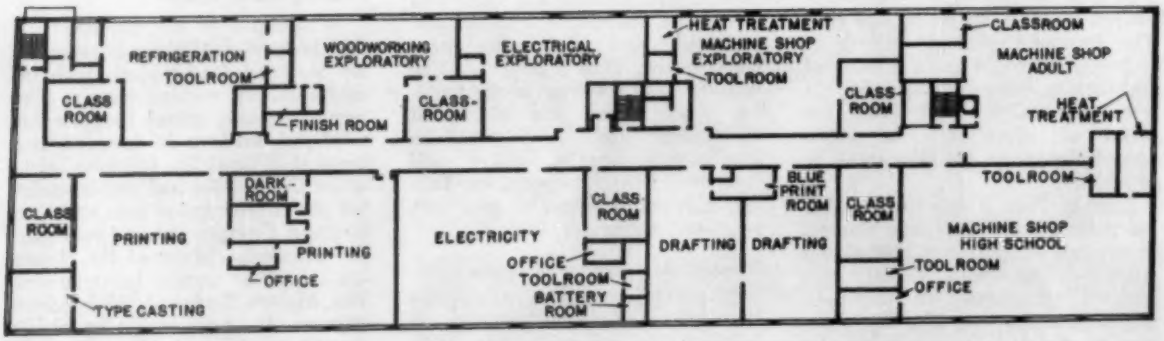
In addition to the daytime student body of 1440 there is extensive use made of Des Moines Tech by adults in the evening classes. The regular evening school program for employed workers is operated two terms each year. The fall term starts about October 1st and continues for ten weeks. The spring term starts on or about February 1st and continues for ten weeks. Many of the classes are taught by regular instructors at Des Moines Technical High School whereas others are taught by highly recommended people from business and industry.

In the fall of 1959 there were 40 classes with 654 adults enrolled in them. Ross Cramlet is in charge of the Adult Evening School. Here is a partial listing of classes offered:

Arc Welding
Automatic Transmissions
Bookkeeping (Beginning)
Diesel Engines
General Office Practice
Hydraulics, Basic
Posting Machines
Real Estate Fundamentals
Shop Math Review
Slide Rule
Stock and Bond Investments
Tool Design
Auto Mechanics
Blueprint Reading
Chemistry, Basic Industrial
Electronics

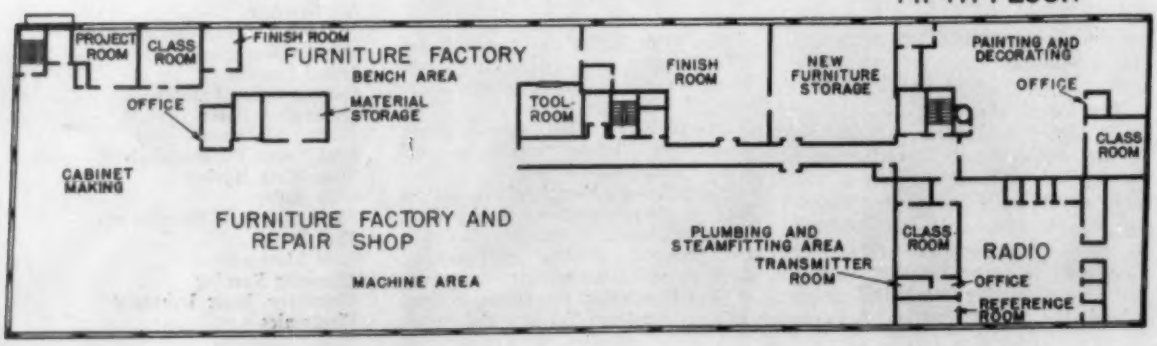


GROUND FLOOR



FOURTH FLOOR

FIFTH FLOOR

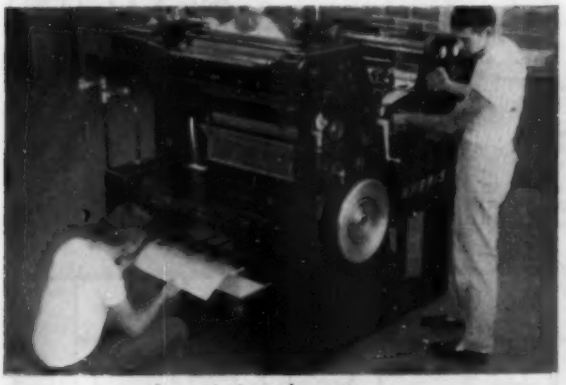


the radio-TV shop

the electrical shop

furniture factory and repair shop

views of typical shop areas in Des Moines' expansive Technical High School –

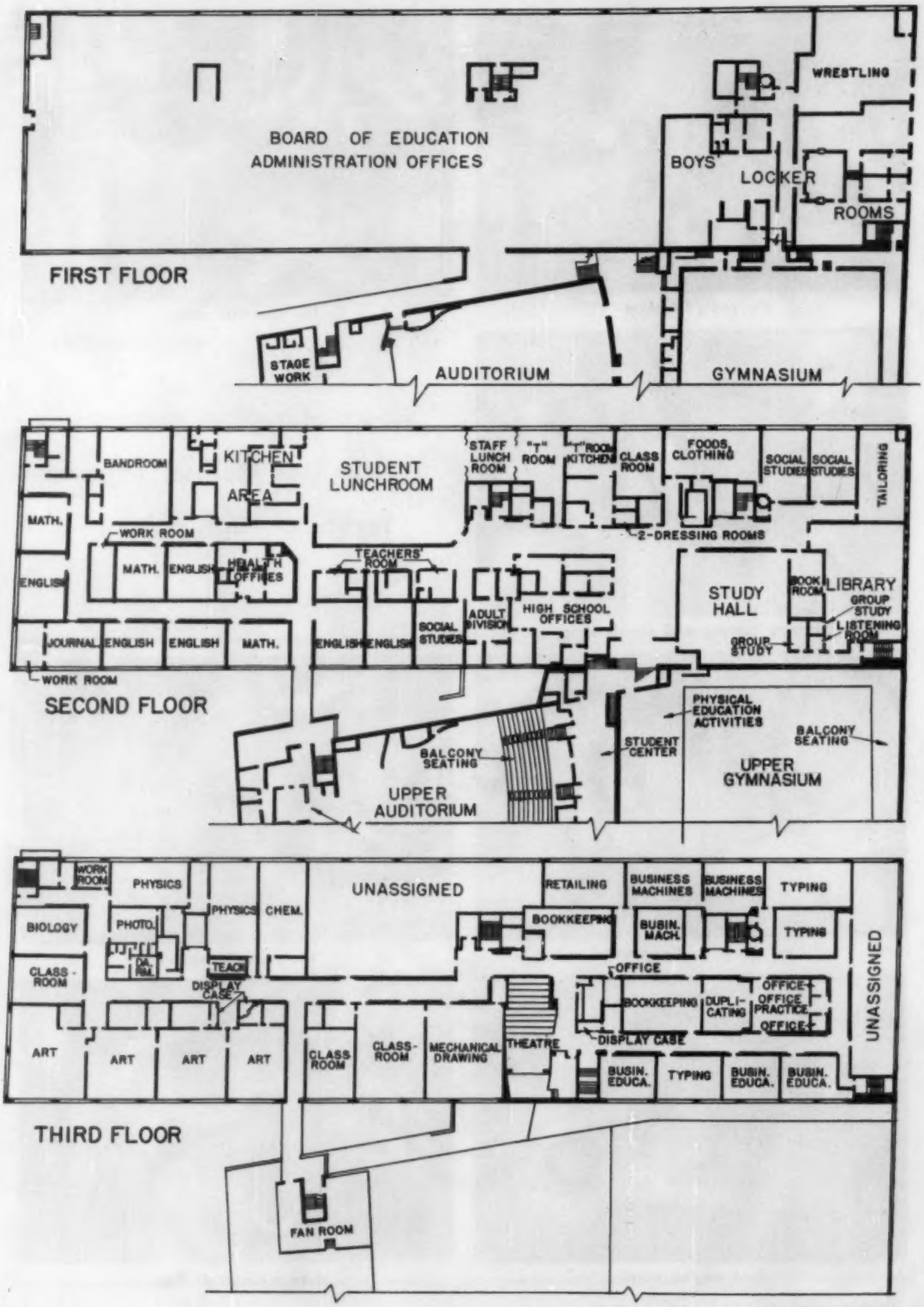


the printing department

the machine shop

auto engine area

auto mechanics shop


BOARD OF EDUCATION
ADMINISTRATION OFFICES
WRESTLING
BOYS
LOCKER
ROOMS
FIRST FLOOR
STAGE WORK
AUDITORIUM
GYMNASIUM
BANDROOM
KITCHEN
AREA
STUDENT LUNCHROOM
STAFF LUNCH ROOM
"T" ROOM
"T" ROOM KITCHEN
CLASS ROOM
FOODS, CLOTHING
SOCIAL STUDIES
SOCIAL STUDIES
TAILORING
MATH.
WORK ROOM
2-DRESSING ROOMS
ENGLISH
MATH.
ENGLISH
HEALTH OFFICES
TEACHERS' ROOM
STUDY HALL
BOOK ROOM
LIBRARY
GROUP STUDY
LISTENING ROOM
ADULT DIVISION
HIGH SCHOOL OFFICES
JOURNAL
ENGLISH
ENGLISH
MATH.
ENGLISH
ENGLISH
SOCIAL STUDIES
GROUP STUDY
WORK ROOM
SECOND FLOOR
PHYSICAL EDUCATION ACTIVITIES
BALCONY SEATING
STUDENT CENTER
BALCONY SEATING
UPPER GYMNASIUM
UPPER AUDITORIUM
WORK ROOM
PHYSICS
UNASSIGNED
RETAILING
BUSINESS MACHINES
BUSINESS MACHINES
TYPING
BIOLOGY
PHOTO.
PHYSICS
CHEM.
BOOKKEEPING
BUSIN. MACH.
TYPING
CLASS-ROOM
DA. RM.
TEACH
DISPLAY CASE
OFFICE
BOOKKEEPING
DUPLI-CATING
OFFICE-OFFICE PRACTICE-OFFICE
UNASSIGNED
ART
ART
ART
ART
CLASS ROOM
CLASS-ROOM
MECHANICAL DRAWING
THEATRE
DISPLAY CASE
BUSIN. EDUCA.
TYPING
BUSIN. EDUCA.
BUSIN. EDUCA.
THIRD FLOOR
FAN ROOM

High School Credit Courses
Income Tax Preparation
Radio Service
Refrigeration — 1
Shorthand
Small Business Management
Television Service
Typing

In addition to the adults enrolled in the classes above, there are 155 apprentices in 19 groups coming to evening sessions.

Apprenticeship training on evenings and on Saturdays is carried on throughout the school year. For example beginning on Saturday, September 19, 1959, a school for carpenter's apprentices began at Des Moines Tech. About 60 young men attended the first four-hour session sponsored jointly by Carpenter's Union Local 106, the Des Moines Construction Council, and the Des Moines schools. Classes will be held each Saturday for 1st, 2nd, 3rd, and 4th year apprentices. Over a four-year period the young men will receive 546 hours of schooling besides working on the job. A. B. Musselman of the Des Moines schools is in charge of this as well as other apprenticeship programs for sheet-metal workers, plumbers and steamfitters, ironworkers, painters and decorators, tool and die makers, bricklayers, typographical, steelworkers, and other craft groups.

Thus it can be seen that the $5,000,000 Tech High is a building that serves the 212,000 people of Des Moines in many ways. It is a regular day school. It has an extensive evening school for employed adults. It carries out a broad program of apprenticeship training.

Elmer Betz, principal of Des Moines Tech, said, "There is ample space for the technical high school to grow by increasing enrollments in various areas and by providing instruction in new areas not now included. There is more room for expansion in shop areas than in academic areas. It is estimated that the enrollment should be approximately 2000 day students within five years. In addition, the school will continue to expand in providing educational opportunities for adults."

radio-TV equipment

student lounge

cafeteria kitchen

structural data

Footings	506 hollow metal tube, concrete filled pilings: average depth 30 feet, capped by mass concrete.*
Structural	Re-inforced precast concrete and structural steel; steel joists: steel deck; some 6" concrete roof slabs.*
Exterior	Face brick; metal panels; limestone; granite.*
Doors	Aluminum; wood; hollow metal.
Interior Walls	Concrete block; lightweight block; metal lath and plaster; metal panels; glazed tile, glazed brick; face brick; sheet rock.
Fixtures	Wood cabinets; green composition chalk boards; cork bulletin boards; glass and wood display cases.
Finish	Birch red oak; cypress.
Floors	Asphalt tile; plastic tile; terrazzo in locker room areas; wood in gyms and wood shops; concrete floors.
Pool	Re-inforced concrete with ceramic tile liner; glazed tile walls; cork ceiling.
Ceilings	Acoustic tile on plaster or concrete; acoustic metal roof; re-inforced concrete.
Lighting	Fluorescent fixtures; incandescent fixtures; mercury vapor in gymnasium.
Electric	Complete sound and public address system; clock and program system; fire alarm system.
Heating	Boiler room in existing building: central fan system used in conjunction with auxiliary radiation; convectors; fin-tube radiation; 3 combination gas-oil burners in 3 high pressure boilers.

* Applies only to new section of building.

The Applied Arts and Science Building

▶ functional, flexible, co-operatively planned, the industrial arts department of this building provides model facilities for the education of teachers —

NOEL B. GRINSTEAD

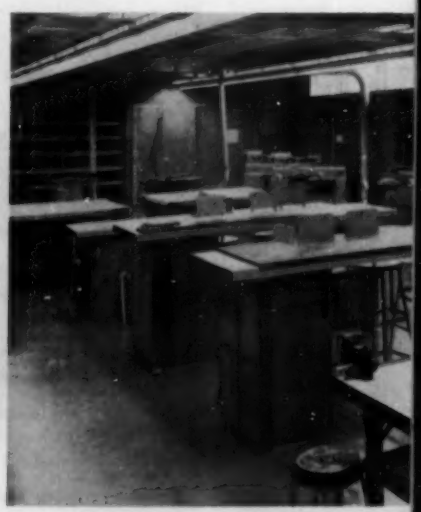
The industrial arts department of Central Missouri State College has a modern, well-equipped building which has been fully occupied since the first of September, 1959.

In 1957 the citizens of Missouri voted a state-wide bond issue of $75 million for the purpose of constructing and equipping needed buildings at the state supported institutions. Central Missouri State College received, as one part of its total financial allocation from this fund, the sum of $1 million for a new applied arts and science building and its equipment.

Actually, the new building is connected to a $500,000 music building which was constructed at the same time and completed during the summer of 1959. The two buildings are connected by a common corridor which serves as an enclosed trafficway, and, together with an inner square open court, serves as a sound barrier between the buildings.

The larger building was designed to house the four member departments of the division of applied arts and science: agriculture, art, home economics and industrial arts. These departments heretofore had been in scattered locations on the college campus, complicating the problem of program co-ordination.

Dr. Grinstead is chairman of the division of applied arts and sciences at Central Missouri State College in Warrensburg.



A view of the print shop in the industrial arts department of the Applied Arts and Science Building at Central Missouri State College.

at Central Missouri State College

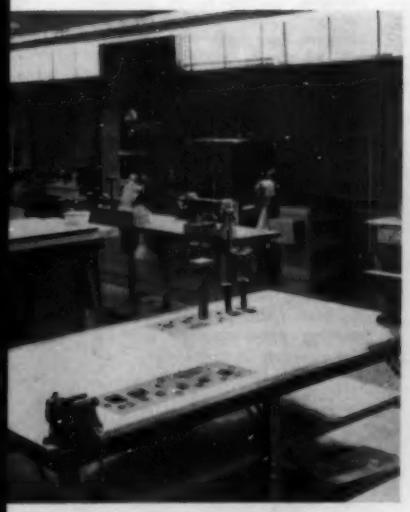
The Industrial Arts Program

The industrial arts portion of the new building was planned on a functional basis to meet the needs of the department, not only as it is now structured, but also as it is envisioned for a number of years in the future. The present undergraduate offerings include instruction in woodworking, metalworking, drafting and design, general shop, crafts, graphic arts, photography, electricity-electronics, and power mechanics. A graduate curriculum leads to the degree of master of science in education. At present, the graduate program is concentrated in the evenings and during summer sessions. Forty-four students are active candidates for this degree with a major in industrial arts education.

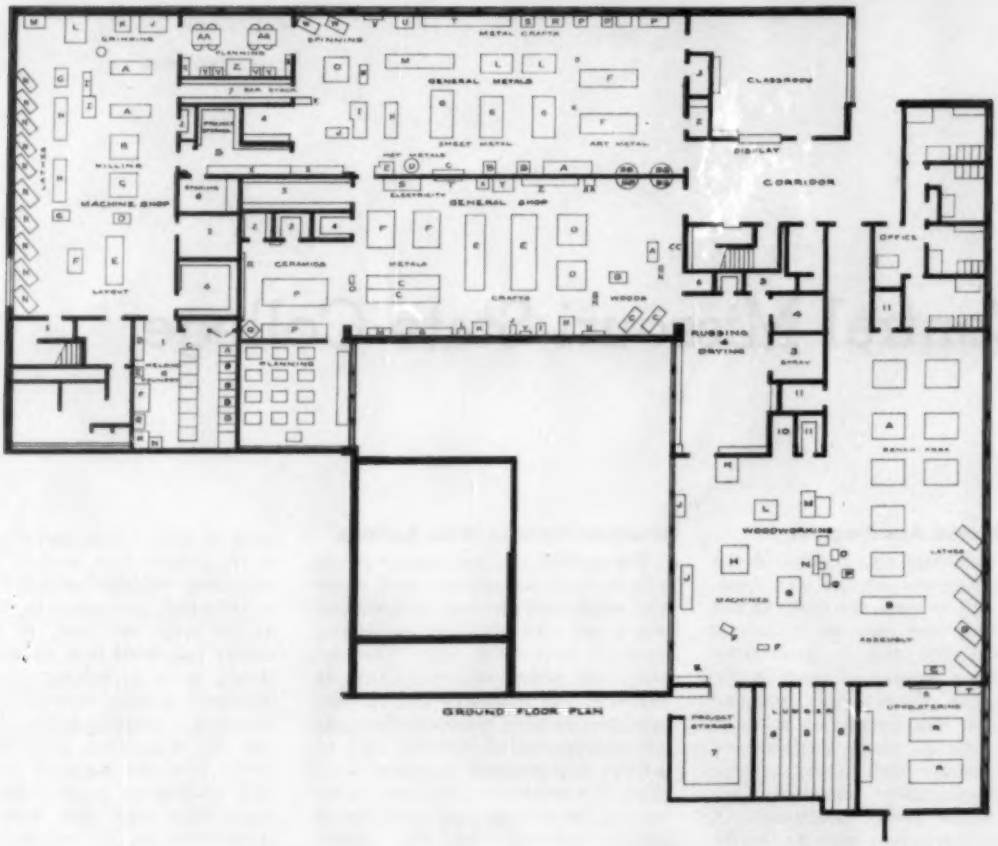
Structural Features of the Building

The applied arts and science structure is built of concrete and stone with reinforced concrete load-bearing beams and columns. Gray sandstone, quarried three miles from Warrensburg, the home of the college, is placed at the entrances and on certain exterior walls to accent the modern aluminum-clad exterior and to achieve architectural harmony with other Warrensburg sandstone buildings on the college campus. When it became evident that the college stockpile of sandstone was to become inadequate, the long inactive quarries were reopened to meet the needs of this and other buildings to be erected.

Two of the four floors of the building have grade entrances. One entrance leads to the central loading dock of the college and the other, on the ground floor level, is used for unloading supplies directly to the corridor that is common to the shops. At the latter entrance, an architecturally concealed dust collecting bin serves as a protecting canopy. A first-floor corridor connects with the adjoining administration building, and the companion corridor above opens into the stage of Hendricks Hall auditorium, back of the proscenium. The main first floor glassed street entrance is architecturally a part of the music building, which also has an air conditioned recital hall adjoining the connecting corridor between the two new buildings. The hollow court opposite the recital hall is featured by a buff brick patio, fountain, pool and grassed area.

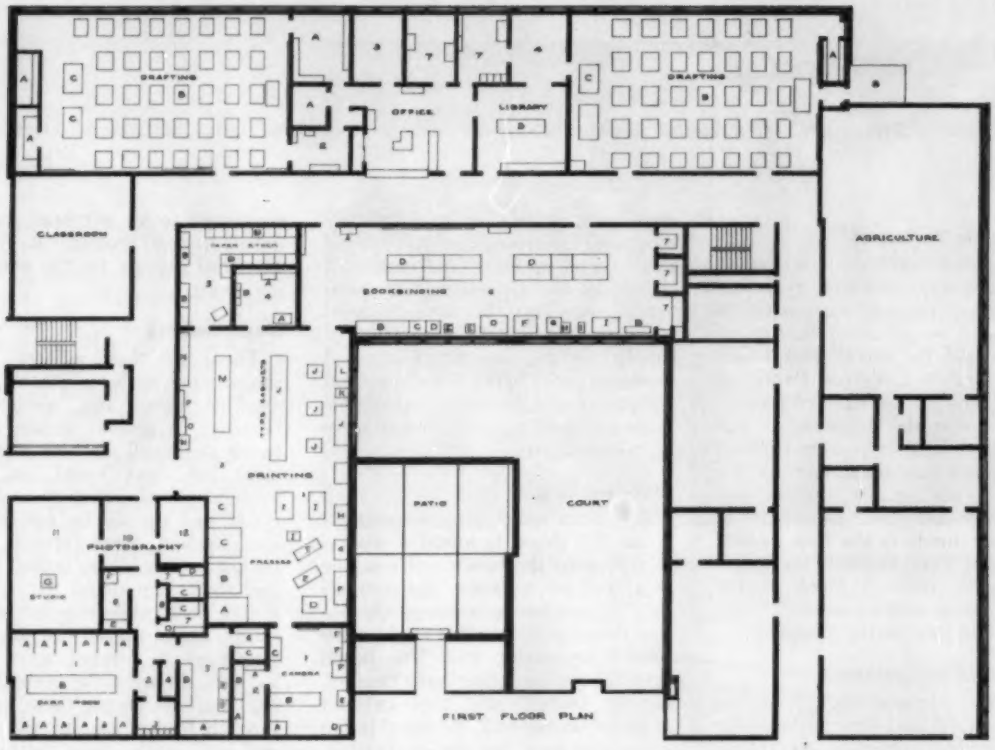


At left is the metalworking, crafts, and woodworking areas of the school's general shop, while above is a closeup of the ceramics area.



The interior block walls are nonloadbearing and are laid in a stacked bond. They are attractively and brightly colored to gain color harmony and variety within a given room or from one room to another. Appropriate shades of gray, green, yellow, brown, and red predominate the color scheme. Reflection factors of different colors have been considered so that optimum use may be made of both natural and artificial light, thus retaining compatibility between attractive appearance and practical needs. Floors on the ground level are concrete, sealed with gray seal, while those on the upper levels are tile. Ceilings in the ground floor rooms and in the upper level art department rooms have exposed reinforced concrete beam channels sprayed with acoustical plaster; otherwise acoustical tile is used throughout for ceiling cover. Corridors are wainscoted with gray ceramic tile. Most of the larger rooms have one wall which is essentially glass above the wainscot. The area

General Shop: 1. composite shop; 2. ceramics; 3. crafts; 4. jig and equipment storage; 5. general storage; 6. plastic sheet storage. **General Shop Equipment:** A. janitor; B. bench saw; C. lathes; D. woodworking benches; E. crafts; F. metalworking benches; G. graphic arts; H. band saw; I. jig saw; J. drill press; K. plastics oven; L. proof press; M. type case; N. buffers; O. metal bender; P. ceramics bench unit; Q. kiln; R. shelving; S. electricity bench; T. leather tools; U. wood tools; V. metal tools; W. ceramic tools; X. welding bench; Y. soldering bench; Z. lockers; AA. pedestal grinder; BB. washers; CC. book case. **General Metals:** 1. general metals shop area; 2. general metals storage; 3. fine metals and lapidary; 4. sheet metals storage; 5. project storage; 6. etching and spraying; 7. bar stock; 8. planning and library. **General Metals Equipment:** A. soldering bench; B. torches; C. tools; D. acetylene welding; E. annealing furnace; F. locker-type benches; G. sheet metal benches; H. metal bench (machines); I. power shears; J. squaring shears; K. spot welder; L. metal crafts; M. art metal bench; N. bar cutter; O. metal bender; P. metal enameling; Q. enameling kiln; R. buffer; S. diamond saw; T. lapidary units and buffers; U. rotary shear; V. tool cabinet; W. spinning lathes; X. coats; Y. drafting tables; Z. map file; AA. study tables; BB. washers. **Machine Shop:** 1. shop room; 2. tool room; 3. precision instruments; 4. general storage; 5. compressor and storage. **Machine Shop Equipment:** A. layout tables; B. vertical mill; C. horizontal mill; D. shaper; E. storage bench; F. turret lathe; G. drill press; H. benches with vises; I. hack saw and bar cutter; J. cylindrical grinder; K. tool and cutter grinder; L. rotary surface grinder; M. surface grinder; N. lathes. **Welding and Hot Metals:** 1. welding room; 2. storage. **Equipment:** A. heli-welder; b. arc welders; C. ten acetylene stations; D. manifold system; E. hand sink; F. molding bench; G. gas furnace; H. heat treat furnaces. **Woodworking** (bench, machine, finishing



and upholstering areas): 1. shop area; 2. drying room; 3. spray room; 4. spray room; 5. compressor; 6. storage; 7. project storage; 8. lumber aisles; 9. upholstering; 10. plywood storage; 11. general storage. **Equipment:** A. benches; B. glue and assembly table; C. radial saw; D. lathes; E. belt furniture sander; F. off-bearing tables; G. saw (15 in.); H. thickness planer (24 by 6. in.); I. jointer (12 in.); J. bandsaw; K. mortiser; L. saw (10 in.); M. tool grinders; N. hones; O. jig saw; P. shaper; Q. drill press; R. layout tables; S. tool cabinet; T. sewing machine. **Graphic Arts: Rooms and Equipment:** 1. Platemaking and camera; A. whirler; B. camera; C. rub-down table; D. Arc lamp; E. vacuum frame; F. layout tables; G. locker. 2. Dark Room: A. storage benches; B. sink. 3. Printing: A. 15 by 20 cylinder press; B. 12 by 18 automatic platen press; C. open presses; D. 22 by 30 offset press; E. 10 by 15 offset press; F. drying racks; G. table; H. offset plate storage; I. imposition tables; J. type cabinets; K. saw; L. proof press; M. planning tables; N. storage lockers; O. roller cabinet; P. tool panel. 4. Composition: A. typewriter desk; B. filing. 5. Paper Stock: A. paper cutter; B. paper storage. 6. Bindery: A. stamping machines; B. silk screen cabinet; C. folder; D. work tables; E. corner rounder; F. paper cutter; G. standing press; H. backer; I. board shears; J. tool panel. 7. Supply. **Photography:** 1. class photography laboratory; 2. light trap; 3. student lockers; 4. storage; 5. production photography laboratory; 6. production film laboratory; 7. class film laboratory; 8. film drying locker; 9. print dryers and chemical storage; 10. reception room; 11. studio; 12. filing. **Equipment:** A. enlargers; B. printing sinks; C. film sinks; D. film loading benches; E. print dryers; F. refrigerators; G. camera and lights. **Drafting, Office, and Supply: Rooms and Equipment:** 1. drafting rooms; A. storage; B. tables; C. layout tables; 2. ammonia developing room; 3. production drafting; 4. specialized drafting equipment; 5. library and conference room; 6. outer office; 7. offices; 8. dust collector for shops.

of north light is significantly large, providing a high quality of natural illumination for those rooms in which the best lighting is imperative. Air conditioning is installed in some areas and provision has been made for intercommunication.

Other general construction features are a service elevator, gray tackboards and green chalkboards with aluminum trim, flush birch doors, steel interior door and window bucks, corridor display cases on all floors, natural gas and compressed air lines, walk-in storage rooms with standard shelving or storage cabinets. Electrical features that are common to most of the rooms are fluorescent lighting which is designed to provide general illumination to exceed adequate footcandle standards for different types of industrial arts work, convenience outlets along the walls at or above bench height and spaced throughout to make 115–208 current available for present and future needs, and plug-ins at benches for the use of portable electric tools.

Responsible Personnel

The architectural firm of Everitt and Keleti was employed to design the building. General administration was headed by president Warren C. Lovinger and the overall supervision was by Dean I. L. Peters. Details of space planning were handled cooperatively within the departments and the problem of coordination between departments was undertaken by the division chairman. A formula was established for the allocation of equipment funds to the four departments that were to share the building. Much credit is given to the entire division staff for practical, persistent, and imaginative planning.

Rooms and Equipment

For the purpose of this article there is no detailed description of the facilities in departments other than industrial arts. Agriculture has two classrooms and two large laboratories. Art has a splendid set of classrooms and studios and an air-conditioned projection room. Home economics has excellent laboratories and classrooms. Detailed descriptions of these areas will appear in other media.

The industrial arts department occupies the ground floor and all but four rooms of the first floor for a total of more than 28,000 square feet of floor space in the new building and some 6000 square feet that are being retained in the former industrial arts building (now known as technical arts building), part of which is devoted to other purposes. In the new building are nine shops and other major rooms designated for woodworking, metalworking, general shop and crafts, graphic arts, drafting, photography, classrooms, offices, and a conference room, and library. The Technical Arts building contains a shop for the laboratory school, one for electricity-electronics, and one for power mechanics.

There were preliminary layout problems to be solved before detail planning could begin. First, a decision had to be made as to the floor level to be occupied by the different rooms and shops. Other items were: accessibility to outside entrances and loading docks, location of freight elevator, relationships between kindred shop activities, weight of heavy equipment in relation to floor construction, convenience of classrooms to all shops, optimum and maximum class sizes and the consequent number of work stations in each area, storage systems and organization of supply centers, the distribution of available funds between building and equipment, and the share of the funds to be allocated to the different areas of industrial arts.

Woodworking

The main wood shop is arranged in an "L" shape to afford a separation between the bench and machine areas and yet to insure the convenience of adjacency without the instructional problems that might come from a separating wall. The bench area has twelve locker base benches, supply rooms, and tool cabinet mounted on the wall. Six wood lathes are in this area, and the smaller machines such as drill presses, wood shaper and small saw and jointer are between this and the machine area. The larger machines are: 24 in. thickness planer, belt furniture sander, wood shaper, mortiser, 12 in. and 6 in. jointers, 20 in. band saw, two circular saws, and radial arm saw.

Auxiliary rooms include one for upholstering, with benches, tool cabinet, layout tables and sewing machine, one for lumber, shelved project storage room, built-in plywood storage, finishing rooms, and three general supply rooms. The lumber storage room has three access doors, each opening to the center of an aisle, both sides of which have 16 in. open end horizontal storage bars. The finishing area has a large shelved rubbing and drying room and two spray rooms. Both spray rooms and the drying room have exhaust, one being equipped with a water backwash to separate the solids in the spray mist and conduct them to a settling basin with water recirculating pump. One of the features of the wood shop is the arrangement of machines which gives consideration to sequential uses of machines with a minimum amount of interference. Lumber feeds straight out of the racks to either the saw, surfacer, or jointer. Standing lockers for student use and coat and wash facilities are in a wide corridor at the shop entrance. All machines are connected to an overhead dust collecting system. Professor R. E. Smith was head planner for the woodworking shops.

Metalworking

There are three adjacent metals shops — one each for general metals, machine shop and welding and foundry. In general metals there is bench and small machine tool equipment for sheet metal, art metal, wrought metal, lapidary and metal crafts, and stations for acetylene and spot welding, blast furnace for annealing, and spinning lathes. Galvanized sheets are stored flat, behind a sliding door, while non-ferrous metal sheets are arranged on edge with separators to prevent scratching of surfaces. Between the general metals and machine shops, there are feed-through project storage shelves, bar and rod stock racks, etching and finishing room, and planning room. Storage type benches and wall lockers are used. The machine shop has ten quick-change gear lathes, turret lathe, two milling machines, shaper, surface grinder, tool and cutter grinder, cylindrical grinder and bench and small machine areas between rows of larger machines. Lathes are placed diagonally with individual accessory panels mounted on the wall back of each lathe. The welding room has tables and booths for acetylene and arc welding including heliarc. Welding booths and tables and other features of planning in the metals area were under the direction of Dr. T. R. Gaines. Welding and finishing rooms have exhaust systems. Likewise the manifold system for the acetylene welding is vented to meet underwriters requirements. There are three machine shop storage rooms and two for general metals. The men's rest room has a shower booth for the use of students who take courses in machine shop and welding. Tools for general use are kept in wall cabinets with folding doors. Precision tools are housed in locked rooms and issued to students in kits.

General Shop and Crafts

This is a multiple activity shop for general crafts and for the use of those who take the course in general shop, which is on the alternate list of required courses in the college

general education program. Physical equipment and arrangement are planned to accommodate students in as many as nine different experience areas including the metalworking, woodworking, electricity, leather, plastics, graphic arts, ceramics, and drawing and planning. The latter is taught in a separate room which doubles as a recitation room.

The general storage rooms are specially arranged for ceramics, metal, wood, and plastic sheets. Tool storage is decentralized. Three special-use wall hanging tool cabinets are placed in parts of the room that make them convenient to the type of work for which the tools are used.

There are two lathes for metal spinning and woodturning, electrical bench and panel, bench saw, band saw, jointer, drill press, ceramics unit with silt trap drains, general metalworking bench and machines, woodworking and crafts benches with storage below, wall lockers and washing facilities. The general shop shares the finishing facilities of the wood shop. Dr. R. E. Goetz was in charge of the planning of the general shop and in the building of tool cabinets. Tools are color coded for type of work and location, and are mounted in special racks or peg board hangers.

Graphic Arts

Both instruction and production work are done in the graphic arts shops (bookbinding and printing). Classes are not required to do production work for the school. The bindery and print shop are arranged in the form of an "L," with the work room and paper stock room in the heel of the "L." Work flows from one shop to the other — bookbinding, silk screen, hand composition, hand fed and automatic presswork. There are seven type cabinets, two open presses, three offset presses, Heidelberg cylinder press, automatic Kluge, darkroom camera, folder, proof press, and a good supply of hand tools. Tools are mounted on a wall panel with pegboard back. The dark room is air conditioned, and the walls of the dark room and the camera room are painted white. Retouching and layout tables are in the camera room, along with offset plate making equipment. The combined office-work room has two IBM electric typewriters.

one of the school's two drafting rooms

the welding and hot metals shop

lathe and milling areas of the machine shop

Storage facilities include built-in racks for binding materials, general storage room and paper stock room with automatic paper cutter. Dr. Goetz also led the planning in the graphic arts shops, which have been chiefly his responsibility since he joined the staff at the college.

Photography

The traditional concept of the photo laboratory has been discarded. Instead of the black-walled individual printing rooms, as formerly used at CMSC, there is a community-type printing room which has a long centrally located developing tank, 8 in. deep and 40 in. wide running parallel to the long dimension of the room. On either side of this tank are twelve individual booths which are closed on three sides, the open side being adjacent to the large developing tank. In each booth is an enlarger or a contact printer. An instructor can supervise the work of an entire class in the printing room. Three separately switched rows of safelights run respectively above the developing tank and above the two rows of work booths. White lights in this room are controlled by a lock switch. Outside the print developing room is a short light-trap corridor, and a locker room for student materials. Film is developed in two separate dark rooms, leading off a short corridor that is provided with a sliding door entrance.

The waiting room is furnished with comfortable modern furniture, record desk and mirror. The portrait studio has two background walls on opposite sides; one wall is a light and the other is a dark neutral gray. The portrait camera and modern portrait lighting equipment are portable. Water temperatures for the processing of prints and films is regulated by thermostatically controlled mixing faucets. The production printing and film developing dark rooms are separate from those used by students. They have complete facilities for developing, printing and drying. Camera and projection equipment include 35mm. camera with interchangeable lenses, press camera, 2¼ by 2¾ camera and 2 by 2 in. slide projector. Prof. Melbourne Jenkins was in charge of the plans and equipment for the photography area. The entire suite of rooms is air conditioned.

An exterior view of Noel B. Grinstead Hall, the new building for the Applied Arts and Science Division of the Central Missouri State College at Warrensburg.

Drafting

The building has two drafting rooms, each planned with equipment for a maximum of 35 students. One room has tables with trunnion-adjusting drawing board tops and drawing board storage, supplemented by storage cabinets along one wall of an adjacent room. The second room is being equipped with new tables that were designed in the industrial arts department and constructed by Chester Simons, a graduate who is a skilled cabinet maker. The tables are built of birch plywood with natural finish, and afford complete at-the-table storage. A compartment in the rear of each table is used for storage of student books, thus clearing the table top of all items except those needed for drafting. Fifteen drafting machines are used in advanced classes. Each room has two large drawing board topped tables for layout work and for the use of vertical drafting machines. An ammonia printer is between the two rooms. Washing facilities are provided. Drafting storage is in rooms at one end of each drafting room, supplemented by the use of steel storage cabinets. Woodtop metal seats are standard, but a few adjustable foam rubber upholstered seats were acquired from surplus.

Electricity-Electronics and Power Mechanics

These new developments are taking place in the former industrial arts building that has been used since 1945. The electronics area is nearing completion and is now in partial use by classes. Occupying a former general shop space, it has adequate room and all new equipment. A former wood shop is used for power mechanics. Equipment is now on order and being received. Plans call for the completion of this area during the coming school year under the direction of Dr. R. W. Innis. Likewise, in the same building a new general shop is being developed for the college Laboratory school. Prof. Smith and Dr. M. S. Schott, head of the Education division, are co-operating in the final arrangements for this new shop which will be entirely separated from college industrial arts, and will be used as a student teaching laboratory for those who do not do off-campus teaching.

Office, Library, and Conference Rooms

Each floor of the new building that is used by industrial arts has a suite of offices with waiting room and individual office spaces. In addition, on the first floor is a library and conference room with a ten-foot conference table and chairs. Books in the library are kept in portable steel open shelved units. Of the three rooms that are available for classrooms, it is hoped that one may be developed into a library, conference and work room, particularly adapted to the needs of graduate students.

▶ a building for a comprehensive i-a college program—

Industrial Arts at Long Beach State College

C. THOMAS DEAN and PAUL KLEINTJES

In 1949 a new state college was located in the city of Long Beach. This was the outcome of several years of planning and many meetings between state department of education officials and Long Beach city representatives. The site selected was a 320 acre tract on the east edge of the city.

The college opened during the fall of 1949 in quarters consisting of two apartment houses which had been converted into temporary classrooms. These were maintained for two years until temporary facilities were constructed on the campus.

The original faculty consisted of 16 members instructing 169 students.

Today the college is housed in a new physical plant which is about two thirds completed at an expenditure of more than $20,000,000. The present faculty has 400 full time members serving a student body of 10,000.

The college has new facilities to house science, mathematics, the humanities, language arts, fine arts, home economics, men's and women's physical education, speech and drama, music, education, bookstore, cafeteria, library, administration, photography, industrial arts, classroom units and residence halls. All of these are part of a master plan developed by a noted architect.

Industrial Arts

Industrial arts was included as a part of the master curriculum plan from the earliest days of the college. Both the local administrators and the state officials recognized the need for this program and made provisions for its implementation. The first industrial arts courses were taught in rented facilities within the Long Beach schools. Laboratory classes were first taught on the campus during the fall of 1952 and consisted of work in general metals, woodworking, and drafting. The program was staffed by two full-time faculty members and served about 20 majors.

Between the years 1952 and 1959 the industrial arts department has expanded to considerable size. From 2 faculty members it has grown to 17 full-time and 4 part-time faculty members; from 20 majors to over 300 majors; from 1 temporary facility to 11 very complete laboratories located in temporary facilities and the near completion of a $1,300,000 permanent building. An adequate budget has been provided by both the local college administration and the state department of education to furnish the areas with the very finest equipment. The instructional staff has been augmented with an equipment technician, stock clerk, division secretary, laboratory assistant, and approximately 12 student assistants. These people play an important part in the smooth functioning of the division.

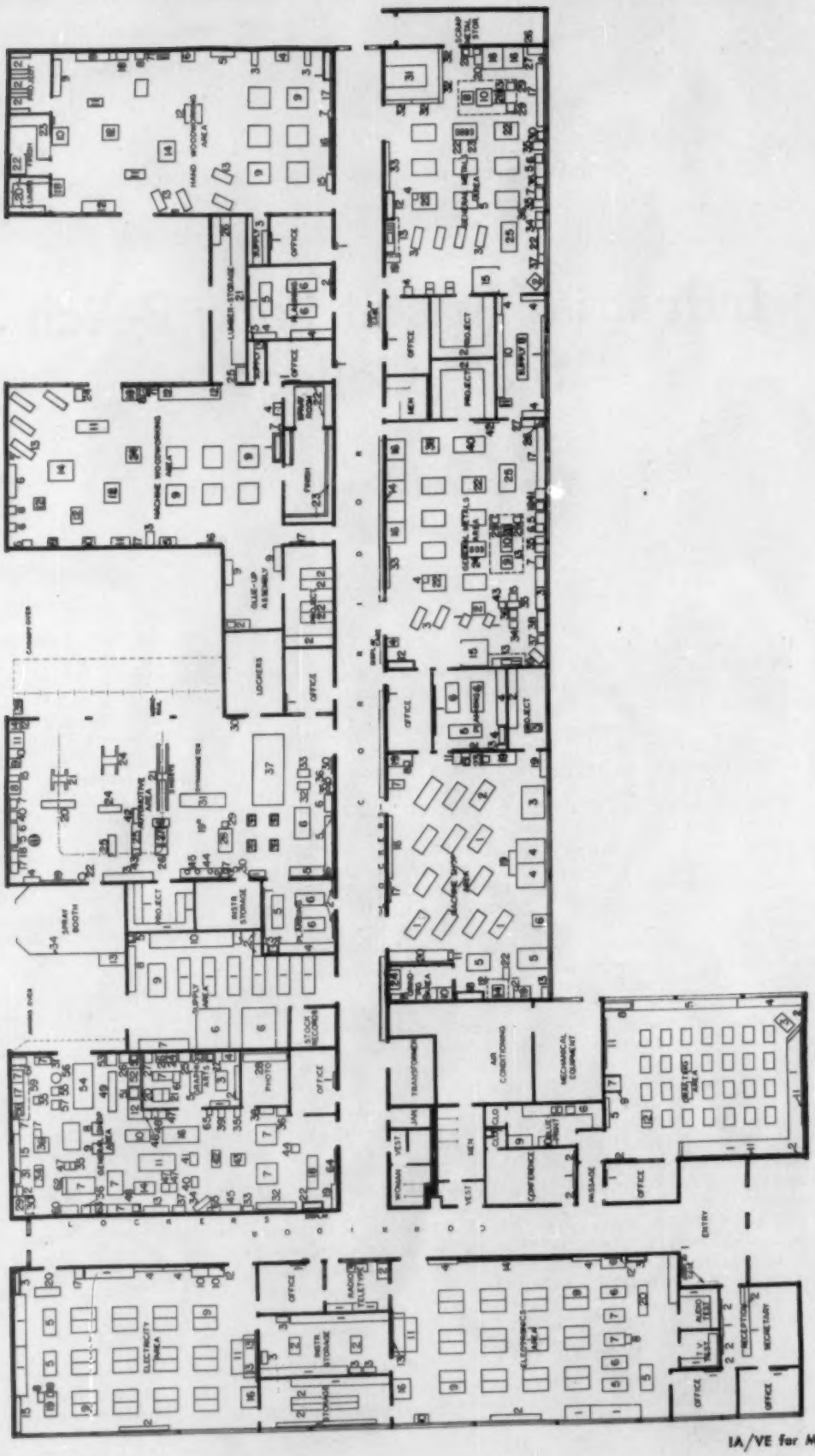
The bachelor's degree in industrial arts is a 124 semester unit program with courses in general education, professional education, and technical courses in industrial arts. Each major must complete 45 semester units of general education to include courses in political science, United States history, biological science, physical science, English composition, public speaking, general psychology, health education, physical education, literature, philosophy, art, mathematics and electives.

He must also complete 22 semester units of professional education to include principles of secondary education, audio visual education, curriculum and methods in industrial arts, history of industrial arts, shop safety, shop planning, industrial arts orientation, problems in teaching industrial arts and student teaching. The technical major must include a minimum of 40 semester units of work covering five basic areas selected from woodworking, general metals, drafting, automotives, graphic arts, and electronics. Twenty-four of these units must be upper division technical courses within the major. The balance of the 124 degree units can be selected as electives to complete the program.

Curriculum Development

The curriculum pattern outlined above requires students to complete

Dr. Dean is chairman of the Division of Industrial Arts and Dr. Kleintjes is associate.


HAND WOODWORKING AREA
MACHINE WOODWORKING AREA
LUMBER STORAGE
OFFICE
FINISH
GLUE-UP ASSEMBLY
LOCKERS
SPRAY BOOTH
PROJECT
PAINTS STORAGE
SUPPLY AREA
STOCK STORAGE
PHOTO
GENERAL METALS AREA
MACHINES
SCRAP METAL STOR.
AIR CONDITIONING
MECHANICAL EQUIPMENT
TRANSFORMER
CONFERENCE
PASSAGE
DRAFTING AREA
ELECTRICITY AREA
RADIO TELETYPE
ELECTRONICS AREA
AUDIO TEST
TV TEST
RECEPTION
SECRETARY
ENTRY
WOMAN
MEN
VEST

Machine Shop: 1. lathe; 2. lathe turret; 3. milling machine, horizontal; 4. milling machine, vertical; 5. shaper; 6. band saw; 7. drill press, upright; 8. drill press, bench; 9. grinder, surface; 10. grinder, tool and cutter; 11. grinder, bench; 12. exhaust hood; 13. heat treat oven, electric; 14. forge, gas; 15. dust collector; 16. tool panel; 17. sliding chalk board; 18. sink and bubbler; 19. bench; 20. storage bench; 21. arbor press; 22. anvil; 23. drill press; 24. cylindrical grinder. **Drafting:** 1. lecture platform; 2. tack board; 3. instructor's table; 4. lay-out tables; 5. cabinet; 6. cabinet and sink; 7. booth, air brush; 8. sink and bubbler; 9. cabinet; 10. print machine; 11. chalk board; 12. drawing tables. **Automotive:** 1. desk; 2. work bench and lockers; 3. tool cabinet; 4. tool panel; 5. tool and tack board; 6. bench; 7. drill press; 8. grinder; 9. oxy-acetylene unit; 10. oxy-acetylene holder; 11. welding bench; 12. arc-welder; 13. air compressor; 14. exhaust blower; 15. dust collector; 16. workbench; 17. glass grinder; 18. glass workbench; 19. headlight screen; 20. wheel aligner; 21. auto lift, 1 post; 22. hydraulic tank; 23. recessed tiedown; 24. auto lift, 2 posts; 25. service bench; 26. sink and grease trap; 27. water tank; 28. lathe; 29. grinder; 30. tackboard; 31. chassis dynamometer; 32. g.r. tester; 33. distributor tester; 34. spray booth; 35. plug cleaner; 36. tank and air supply; 37. auto chassis; 38. steam cleaner; 39. front assembly; 40. polish head; 41. tire service; 42. brake lathe; 43. wet hone; 44. aligner; 45. refacers. **Planning rooms:** 1. chalkboard; 2. tackboard; 3. metal files; 4. cabinets; 5. demonstration bench; 6. table. **Secretary:** 1. reception counter; 2. mailboxes. **Conference:** 1. chalkboard; 2. tackboard. **General Shop:** 1. display case; 2. cabinets; 3. planning table; 4. drawing table; 5. type cabinets; 6. art press; 7. bench; 8. bench, battery; 9. bench, electric; 10. bench, appliance; 11. bench, leather; 12. bench whirlers; 13. steel bench; 14. lapidary bench; 15. rubbing bench; 16. bench, plastic; 17. soldering bench; 18. demonstration bench; 19. steel shelves; 20. table and storage; 21. proof press; 22. sink cabinet; 23. binding table; 24. paper storage; 25. paper cutter; 26. drying rack; 27. platen press; 28. photo room cabinets; 29. spray booth; 30. spray booth cabinet; 31. tool panel; 32. tool panel and cabinet; 33. storage cabinet; 34. lathe; 35. grinder; 36. drill press; 37. parts storage; 38. chair rack; 39. scroll saw; 40. band saw; 41. sander; 42. jointer; 43. saw; 44. planer; 45. vertical storage rack; 46. press, plastic; 47. buffer; 48. oven; 49. welding table; 50. damp cabinet; 51. sink unit; 52. potter's wheel; 53. kiln; 54. auto chassis; 55. outboard motor; 56. test band; 57. engine mower; 58. furnace; 59. exhaust hood; 60. bar stock rack; 61. welding unit; 62. brake; 63. fume hood; 64. sliding chalkboard; 65. floor sweep. **Supply Rooms:** 1. shelves, steel; 2. steel cabinet; 3. cabinet; 4. storage cabinet; 5. sink cabinet; 6. lumber rack; 7. radial arm saw; 8. sheet metal rack; 9. plywood rack; 10. metal rack; 11. power hack saw. **Stock Storage:** 1. adjustable steel shelves; 2. storage cabinets. **Instrument Storage:** 1. storage racks and cabinets; 2. instructor's bench; 3. roll-a-way carts. **Radio and Teletype:** 1. transmitter; 2. table; 3. telatype. **Project Room:** 1. storage cabinets; 2. project cabinets; 3. power hack saw. **Closet:** 1. sink cabinet. **Entry:** 1. Tackboard. **Woodworking:** 1. sink and bubbler; 2. sink and cabinet; 3. jig-saw; 4. grinder; 5. tool panel; 6. sander; 7. floor sweep; 8. drill press; 9. bench; 10. shaper; 11. jointer; 12. saw; 13. lathe; 14. surfacer; 15. display case; 16. chalkboard; 17. tackboard; 18. mortiser; 19. boring machine; 20. lumber rack; 21. lumber storage; 22. spray booth; 23. metal cabinet; 24. band saw; 25. bins; 26. compressor. **General Shop:** 1. shaper; 2. milling machine; 3. lathe; 4. drill press; 5. grinder; 6. wire wheel; 7. buffer; 8. foundry; 9. foundry furnace; 10. forge; 11. sink cabinet; 12. sink and bubbler; 13. exhaust hood; 14. exhaust; 15. spray booth; 16. welding booth; 17. welding bench; 18. welding cart; 19. spot welder; 20. core bench; 21. core oven; 22. bench; 23. benches and 4 gas furnaces; 24. solder bench; 25. squaring shear; 26. flash arrestor; 27. oxy-acetylene holder; 28. tong rack; 29. anvil; 30. oxy-acetylene cutting table; 31. molding bin; 32. pit grating; 33. tool panel; 34. disk sander; 35. dust collector; 36. belt sander; 37. sand blast unit; 38. spinning lathe; 39. sheet-metal machines; 40. box and pan brake; 41. cutting table; 42. sliding chalkboard; 43. band saw. **Reception:** 1. bulletin board; 2. tackboard. **TV and Audio Test Rooms:** 1. bench. **Electricity-Electronics Laboratory:** 1. storage cabinet; 2. cabinet; 3. sink cabinet; 4. tool panel; 5. tool bench; 6. hand tool bench; 7. planning tab'e; 8. dust collector; 9. laboratory bench; 10. instructor's bench; 11. demonstration bench; 12. bulletin board; 13. sliding chalkboard; 14. chalkboard; 15. plating bench; 16. switch board; 17. oven stand; 18. belt sander; 19. table; 20. lathe. **Corridors:** 1. tackboard.

twelve semester hours in an area to qualify for unit shop certification. Students at Long Beach State College are required to complete the requirements for at least two unit shops. The total program is planned so that graduates will have not only a sound general understanding of industrial arts but sufficient depth in their unit areas to assure technical competency.

Major divisions and areas of instruction include:

1. Woodworking — hand and machine, furniture construction, painting and finishing, small boat construction and carpentry.

2. General metals — survey courses of the industry and units in machine shop, sheet metal, pattern and foundry, art metal, welding, forging and heat treatment.

3. Automotives — a survey course, engine rebuilding, power flow and suspension, electrical systems, trouble shooting and tune up and body rebuilding and refinishing.

4. Drafting — industrial drawing, machine drafting, architectural design and drafting, small boat design and technical sketching.

5. Graphic arts — a survey course, letterpress and offset printing, presswork, design, silk screen, bookbinding, photography and graphic arts handicrafts.

6. Electronics — basic electricity, house wiring, appliance and motor repair, electronic circuits and systems, radio and television construction and servicing, amateur communications and ultra high frequency circuitry.

7. Handicrafts — leathercraft, plastics, ceramics, lapidary and model building.

In addition to the regular curriculum, service courses and special summer session offerings have been provided to meet the varied needs of the college community.

Through close co-operation with the elementary teacher education department, two courses in industrial

architect's perspective of the exterior of the industrial arts building of Long Beach State College

arts for elementary teachers have been developed.

Exploratory courses in woodworking and in general metals have also been developed for art majors.

An outstanding summer session offering, aviation education workshop, has won national recognition. Its popularity is evidenced by enrollments repeatedly in excess of one hundred students most of whom are elementary school teachers.

Another special summer session offering is a technical seminar. This is a course designed to bring the industrial arts teacher up-to-date with industrial processes and to develop techniques for implementing these in the industrial arts program. The most popular seminars have been in electronics and automotives.

Industrial Technology

In response to a request from industry and in co-operation with the junior colleges in the state college service area, a program leading to a bachelor of science in industrial technology has been implemented. The present offerings are limited to three basic options each of which will qualify the graduate for industrial employment.

The option, tool engineering technology, is primarily concerned with supervision of the development, design, construction and installation of manufacturing tooling and equipment.

Architectural technology is concerned with the co-ordination of building activities, interpretation of architectural specifications and the general overseeing of planning and construction of structures.

Electronic technology is concerned with the reduction of advanced research projects to production practicability and the utilization of advanced manufacturing techniques to component production.

The industrial technology program at Long Beach State College is confined to the junior and senior years. Students majoring in this curriculum complete their first two years of work at the junior college.

Graduate Program in Industrial Arts

A graduate program leading to the masters degree in industrial arts is offered with primary emphasis on professional growth. This has been developed to enrich the undergraduate major and is offered both during the regular year and summer session. The masters degree candidate has two options from which to select his graduate program. One emphasizes teaching; the other, liberal arts.

Permanent Building

The building at Long Beach encompasses a working area of approximately 50,000 square feet and houses ten laboratories. These include electronics, electricity, comprehensive general shop, automotives, machine woodworking, hand woodworking, general metals (light), general metals (heavy), machine shop, and drafting. Each area is supplemented with auxiliary room forming an integral unit.

The exterior is brick construction to harmonize with other buildings on the campus. The interior walls are concrete block and plaster providing acoustical and insulating qualities. The ceiling height is 14 ft. which provides ample clearance in all areas. An eyebrow sunshade has been installed across the south and west sides of the building to provide shade for those areas which tend to receive the direct sun.

The roof is flat, consisting of metal decking which has been welded into place and covered with a two inch layer of insulation board. This has been covered with hot tar, roofing paper and rock making a roof with a minimum twenty year guarantee.

The floors are treated concrete with vinyl asbestos tile in the offices, corridors, conference, seminar and drafting areas. The electrical service has been installed beneath the floor using a grid system to allow for maximum flexibility within each area.

Underground exhaust systems have been provided in both woodworking areas, the comprehensive general shop and the automotives shop. These have been provided with ample cleanouts to alleviate problems of stoppage. Additional exhaust units have been provided for all grinders, buffers, sanders and equipment which create heat or dust. There will be no machine or equipment in any area that will not be properly exhausted.

The windows are continuous metal sash which are gang operated. These have been held at a height of four ft. above the floor insuring wall space on all sides of the laboratory. Each area has been arranged to utilize as much natural lighting as possible. Fluorescent lighting has been used throughout with a minimum of 30 to 50 ft. candles provided at the working surface. Filters have been installed for all circuits that would tend to interfere with equipment operation such as in the electronics area.

The building has a large central gas fired heating unit with an emergency oil supply. Those areas where localized heating is necessary have been provided with Westinghouse localized heating units. Facilities have been installed for the air conditioning of all offices, conference and seminar rooms.

Acoustical treatment has been used throughout the entire building and all laboratories are clear working areas without columns of any type.

The millwork is natural birch with all cabinets having adjustable shelving. In those areas such as machine shop, general metals and automotives metal lined cabinets have been installed.

Special Features

A division office has been included within the building to house the division chairman and clerical personnel. A two-man office adjacent to each of the laboratories has been provided for the full time faculty.

Approximately four hundred student lockers have been installed in the corridor for assignment to students enrolled in industrial arts classes. Student project lockers are also provided in each instructional area.

The conference rooms, planning areas, drafting room, electronics and electricity laboratories have been provided with audio visual facilities which include projectors, screens and speaker outlets. Each planning area has a laboratory type demonstration bench for presenting instructional material.

Bond beams have been installed in all auxiliary rooms so that mezzanines can be added at a later date for additional storage space.

The interior will be finished in light pastel colors with the equipment painted to provide for good color dynamics. All work areas around machines will be zoned for safe working conditions.

Each laboratory has at least one double door which is readily accessible for the delivery of equipment. Enclosed compounds adjacent to the woodworking and automotives areas permit work to be done outdoors in such courses as carpentry, small boat construction and advanced automotives.

The industrial arts and technology facilities when complete will be housed in two separate units. For this reason, graphic arts, light transportation, handicrafts and a second drafting facility, which are included in the second increment, are not described at this time.

General facilities. All of the laboratory areas have some general features. A central power control panel is located within each instructional area. These are supplemented with emergency circuit breakers located at

convenient spots. A two-man office opens into each laboratory as well as into the central corridor enabling faculty members to enter or leave the office without disturbing a class which is in session. A planning and instructional center is located adjacent to or between similar areas such as machine and general metals.

Each laboratory has a student project storage area and a materials and supply storage room. This supply room is primarily for instructional materials and small quantities of hardware and special equipment.

High Lights of Specific Areas. Automotives, 40 by 90 ft. There are three double doors opening into a 40 by 50 ft. enclosed compound. A 16 ft. roof extension with a monorail and chain hoist provides additional covered work area within the compound. Three types of lifts have been installed — single post frame contact, single post axle contact and a twin post axle contact. These provide facilities for various types of work and student experience. Major items of equipment include a chassis dynamometer, steam cleaner, hot caustic degreasing tank, carburetor tank, complete testing equipment including electronic scopes for ignition work, engine rebuilding facilities, brake and suspension equipment and collision service. A special 16 by 28 ft. commercial paint room, equipped with forced exhaust and infra-red lights is a special feature of the automotive collision service area. The sub floor exhaust system provides outlets to each car station and mounted test engine. Auxiliary areas have been provided to include a locker room with two wash basins, an engine storage room, and an equipment and supply room. A sprinkling system has also been installed in this area to eliminate the possibility of fire.

Drafting, 40 by 50 ft. Thirty work stations equipped with drafting machines are located in this area. The adjacent print room contains facilities for all types of modern print reproduction.

Electronics and electricity. The tremendous expansion in the field of electronics and the difference in equipment and procedures between electronics and electricity called for separate laboratory facilities. The electronics area is 40 by 80 ft. with shielded auxiliary rooms for television and audio-circuit testing. A computer room for test purposes and an amateur radio station with teletypes are a part of the facility. A master control panel is located in each area to provide both alternating and direct current to a power panel at each student station. The station panels have been designed and built by the electronics staff. The latest types of electronic equipment and test units are included in the laboratories as well as machine tools and sheet metal equipment.

The electricity laboratory, which is 40 by 60 ft., contains an electroplating unit and special facilities for presenting basic electrical theories and principles. General machine and hand equipment for the mechanical phases of servicing are also provided.

Comprehensive general shop, 40 by 90 ft. The comprehensive general shop has been planned as a facility for service courses, elementary industrial arts, some aspects of handicrafts, experimental work in special or graduate problems and as an experience in general shop management and organization. Included within this unit are graphic arts, basic photography, woodworking, metalworking, handicrafts, transportation, and electricity. The graphic arts unit has been placed in a glass enclosed section to reduce dust and noise to a minimum. Because of the variety of courses this laboratory must serve it has been planned to reflect the ultimate in the comprehensive general shop program.

Metals. The metals program is provided for in three separate areas:

1. A unit machine shop, 40 by 60 ft., with heavy precision machine tools. Included in the equipment are 11 13-in. and 1 17-in. lathes, a 20-in. shaper, a back geared drill press, a tool and cutter grinder, surface grinder, cylindrical grinder and vertical and horizontal mills. Other machine tools are also provided to round out the program.

2. A general metals and pattern and foundry area.

3. A general metals area. The general metals areas include manifold oxyacetylene welding units, arc welding booths, heliarc welding, a six-place molding bin with recessed pouring pit, facilities for carbon dioxide core making and units in sheet metal, art metal and machine metal. The program has been planned and equipped to provide instruction in all the basic areas of the metals program and can be carried on in either of the two general metals shops.

Woodworking, machine woodworking has 40 by 85 ft., and hand woodworking, 40 by 80 ft., adjacent to a common compound, 40 by 50 ft. Both facilities have sub floor exhaust systems servicing all machine units and floor sweeps. The machine wood equipment includes a 30-in. surfacer, one 16-in. sliding table variety saw, a 12-in. table saw, a 10-in. table saw, 8 and 12-in. jointers, 20- and 30-in. bandsaws, 15-in. drill press, shaper, mortiser, four wood lathes, oil stone grinder, scroll saws, spindle, disk and belt sanders, a 12-in. radial arm saw, and an electronic gluing device. The auxiliary areas include a gluing and assembly area, a finishing room and spray room with water wash exhaust, special supply room, project storage area and lumber storage room. The hand woodworking area has been planned and equipped to teach both hand and machine woodworking and includes an 18-in. surfacer, 10 and 12-in. circular saws, 14- and 20-in. band saws, 6- and 8-in. jointers, 12-in. radial arm saw, four wood lathes, scroll saws, shaper and disk and belt sanders. The auxiliary areas include a finishing room, lumber room, project storage area and a special supply room. The compound between the shops contains a gas fired 18-ft. pressurized steam chest to be used in forming lumber to various shapes.

Central supply area. A central supply room has been provided to facilitate the control of materials and supplies and to relieve the instructors of the problems of receiving, inventorying and issuing stock. This area is equipped to receive, cut to handling size, store and issue by unit all of the materials and supplies normally needed in the instructional program. Special fireproof facilities are provided for handling volatile and flammable materials.

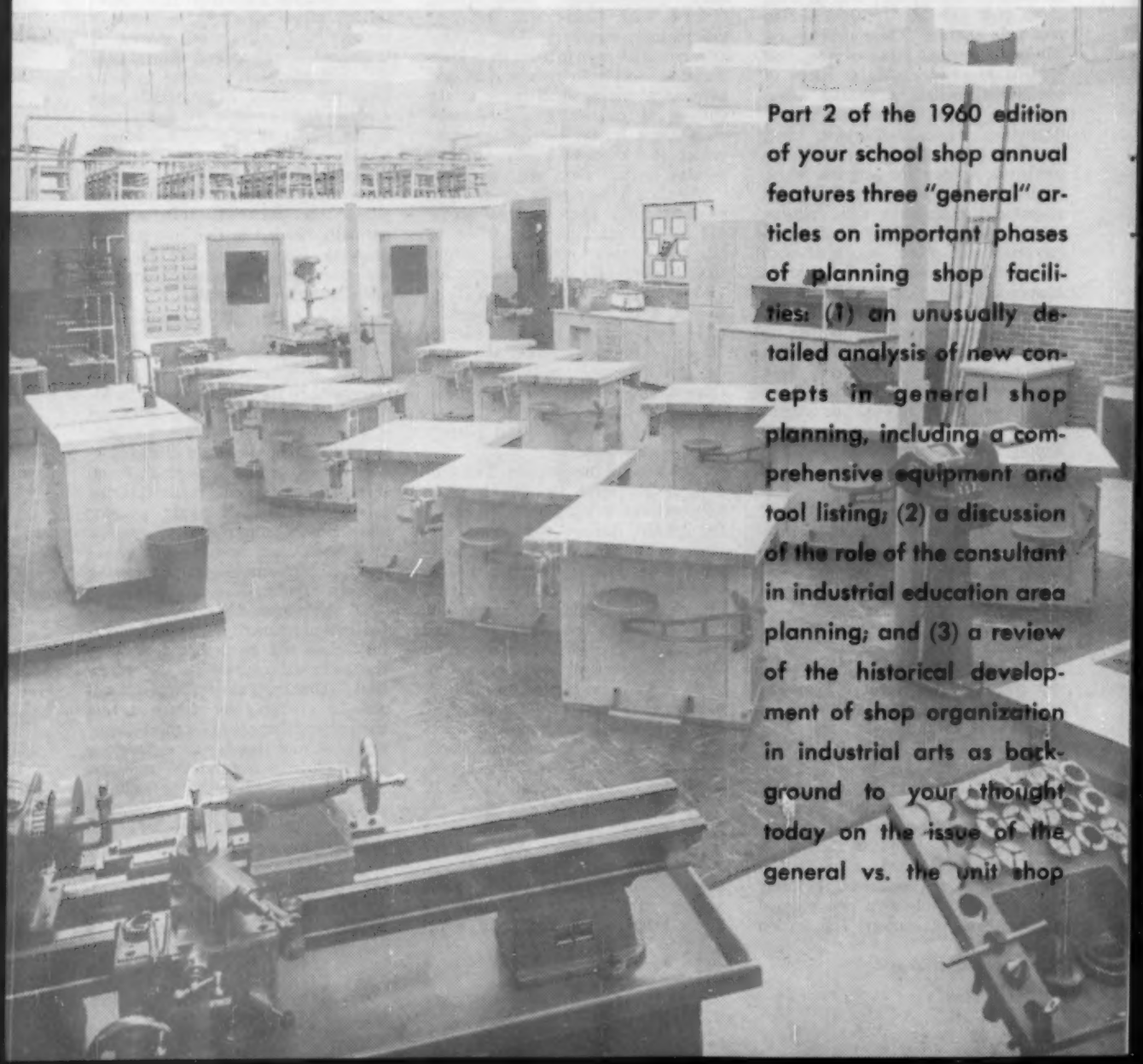
An Addition

The staff is now drawing plans and writing specifications for a second increment to the industrial arts building. This unit will be two stories and will consist of the following: a division office, coordinator's offices, faculty offices, graduate seminar room, light transportation, manufacturing processes laboratory, light graphic arts, photography, heavy graphic arts, handicrafts and elementary industrial arts, architectural drawing and classrooms.

Of these areas the most unique is the manufacturing processes laboratory. This will be designed to serve the technical courses of the industrial technology curriculum. It will also be available for demonstrating the industrial application of the basic processes and theories to engineering and industrial education students. Some of the facilities to be included are those for chemical milling, anodizing, powder metallurgy, induction heating processes, plastic lamination, structural member design, automation, quality control, testing and production analysis, and planning techniques.

1960

shop planning



Part 2 of the 1960 edition of your school shop annual features three "general" articles on important phases of planning shop facilities: (1) an unusually detailed analysis of new concepts in general shop planning, including a comprehensive equipment and tool listing; (2) a discussion of the role of the consultant in industrial education area planning; and (3) a review of the historical development of shop organization in industrial arts as background to your thought today on the issue of the general vs. the unit shop

New Concepts in Planning General Shops

GILBERT R. HUTCHINGS

▶ a comprehensive analysis of the principles of a good general shop program and the facilities and equipment for instruction, storage, etc., needed for that program —

One of the major problems of industrial arts is the planning and equipping of the general shop for effective teaching.

A good industrial arts program, especially in the small high school, is difficult to attain. The general shop sometimes is only a glorified wood shop. The traditional idea has been to plan the general shop in such a way that three, four, or five activities can go on simultaneously. Usually there are one or two woodworking benches, a metal bench, a few drawing tables, and perhaps one electrical bench. The industrial arts teacher is expected to rotate his class through a series of activities, operating all of the areas at the same time.

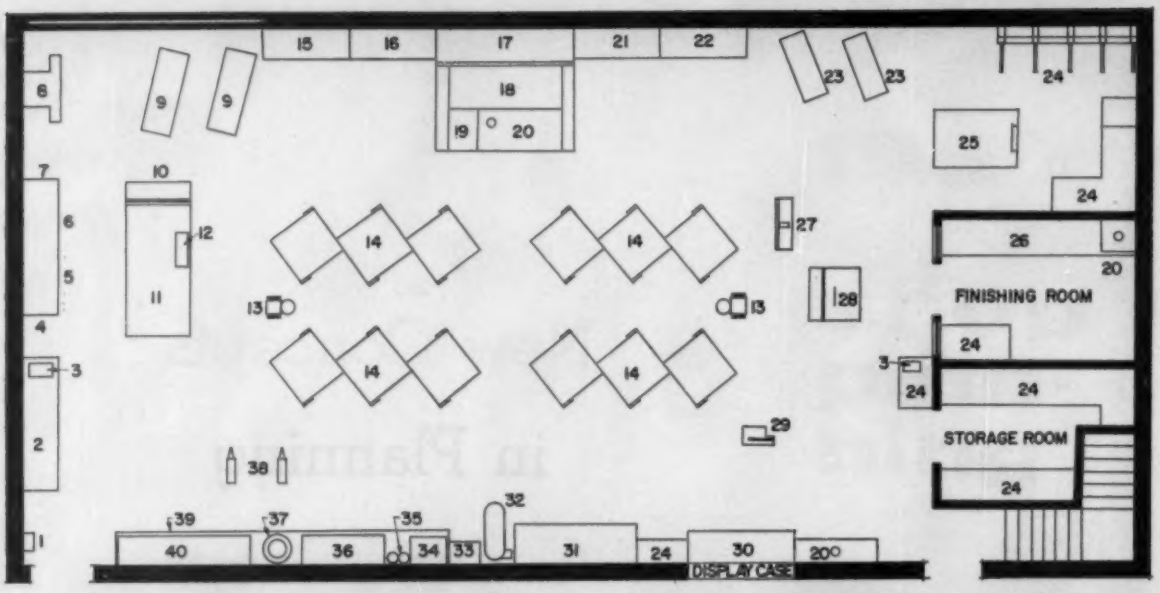
Problems of the General Shop

The problems involved in this kind of teaching situation are overwhelming. How do you handle group demonstrations? What about lectures and visual aids? How can a teacher keep the students busy in real learning experiences? How can he handle the problem of distributing supplies and materials? Under such conditions the teacher resorts to the line of least resistance. He either concentrates on a single area, such as woodworking, and makes all of the other areas incidental, or he merely "keeps shop" instead of trying to teach industrial arts.

Some of the question that arise in the general shop situation include the following:

1. How can good teaching be done in this kind of shop?
2. How can the concepts of modern industry be taught in the small high school?

Mr. Hutchings, formerly an instructor of industrial arts in the Grand Rapids, Mich., high schools, is associate professor of industrial education at Western Michigan University at Kalamazoo.



1. Power panel (main disconnect and circuit breakers); 2. metal bench; 3. drill press; 4. slip roll former; 5. rotary machine; 6. box and pan brake; 7. bar fold; 8. vertical mill; 9. metal lathe; 10. squaring shears; 11. sheet metal bench; 12. sheet metal punch; 13. pedestal grinder; 14. woodworking benches; 15. wardrobe cabinet; 16. metalworking; 17. chalkboard; 18. demonstration platform; 19. projector table; 20. sink; 21. woodworking; 22. illustration and reference cabinet; 23. wood lathe; 24. storage (lumber); 25. glue and clamp bench; 26. bench and storage; 27. jointer; 28. circle saw; 29. band saw; 30. leather and plastic display case; 31. electrical test bench; 32. power saw; 33. metal rack; 34. welding bench; 35. welding tanks; 36. molding bench; 37. smelting furnace; 38. anvils; 39. forge and solder bench; 40. hood.

3. What is the best method of storing the wide variety of materials needed in a good shop?

4. How can the various areas of the general shop be integrated?

5. What are the best methods of handling students in the general shop?

At Western Michigan University in Kalamazoo, 50 per cent of the graduates teach in general shop situations their first year. There are approximately 900 communities in Michigan that have industrial arts shops; 700 have a single teacher, while the others have from 200 to 300 teachers. In an effort to answer some of the questions involving the general shop, the industrial arts staff at Western decided to build an ideal general shop, designed for the one-teacher situation. General-unit shops in all areas were already available.

A survey of existing facilities showed that the only location was the space then occupied by the two drafting rooms. These classes were moved out to another building. The area made available was a room 33 by 66 ft., or slightly less than 2200 square feet. This is 200 square feet less than the recommended 2400 square feet needed for a good junior high school general shop. The accompanying photographs illustrate dramatically what can be done with a 40-year-old building when a thorough remodeling job is performed. Construction began in October, 1958, and the shop was complete and ready for use in February, 1959.

Basic Principles of the Program

The shop was planned to meet the following basic principles of a good general shop program:

1. The shop must be an ideal teaching situation. All students should have a seat and the teacher should have the facilities for doing all types of demonstrations and using all types of visual aids.

2. The shop should be designed to give equal stress to each of the following areas: power mechanics, metalworking, woodworking, drafting, electricity, and arts and crafts. No one area should dominate the shop.

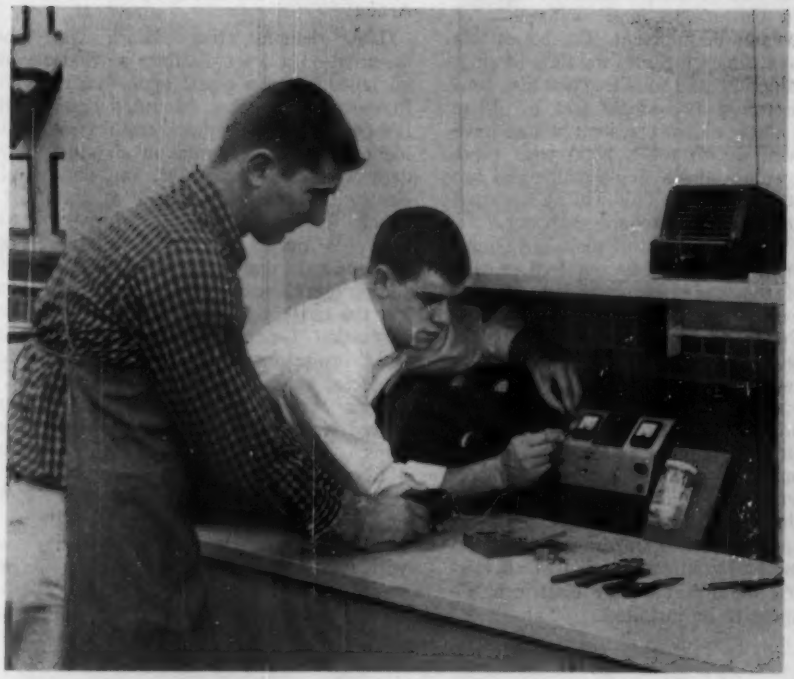
3. The shop should be designed for use in several different teaching situations. For example, the entire shop ought to be convertible for use as a drafting room, or as a metal shop, or as an electrical shop, power mechanics shop, etc. As an alternate, the shop should be ready for use with part of the students working in one area and part in another. Hand tools should be of sufficient quantity to permit all students to work on a single activity at one time.

4. The shop should be designed to make maximum use of floor area. Even when the shop is used for unit-type teaching, a large percentage of the area should be in use.

5. The shop should be designed for maximum cleanliness and ease of maintenance. All the woodworking tools should be located in one end of the shop and metalworking tools in the other. There should be provision for waste removal.

Because of the somewhat limited floor space, the placement of equipment had to be figured quite accurately. Mock setups were made. Distance relationships of machines were carefully noted and included in the final plan.

The student work center type of bench was selected because of its adaptability to the general shop. These benches were centrally located for use to their fullest advantage. All woodworking was concentrated in one end of the shop with metalworking at the opposite end. Those areas which lend themselves partic-



Using the electrical test bench to check a transistor radio. Since there is an electrical outlet for each student installed in each work station, the entire room is an electrical shop, except for special testing.

Using the shop for planning and drawing

Working at sheet metal and power mechanics

Using the shop for related information on design

Working at the woodworking machines

ularly to woodworking, such as plastics and leather, were kept together for convenience and availability of tools and equipment. The hot-metals area, which includes welding, forging, soldering, and foundry, was also concentrated in a single area to utilize a single exhaust system. Plans have been drawn for a hood with three openings and a single motor and fan of proper size. This will be mounted on the roof to reduce shop noise.

A complete list of tools and equipment that would be required in each of the areas was compiled. Enough tools were ordered for each area so that a class of 24 students could be handled in any of the basic courses. While tool lists were being made up, work was completed on the utilities. The exact placement of all electric switches and outlets, plumbing, and gas and compressed air outlets was carried out as indicated on the plans. The size of power panel and the needed amperage were determined by study of a list of all electric motors and large electric appliances to be installed.

A-V, Lecture, and Demonstration Areas

The demonstration bench is mounted on a 6 in. platform so that all students have equal opportunity to watch the teacher. Mounted here is a combination wood-and-metal vise identical to those found on all student work centers. Water, gas, and electricity are also available at the bench for demonstration purposes. There is ample storage space for audio-visual materials behind the sliding chalkboard, in the cabinet below the chalkboard, and in the demonstration bench. The movie and slide projectors are stored in the projector table. This is mounted on rubber casters and can be easily moved into position for showing films.

Plans have been made to mount two coaxial speakers, one at either end of the teaching center. These will be mounted permanently and wired with two jacks, one on the wall opposite the movie screen and the other on the demonstration bench for use with the movie projector or a tape recorder.

The movie screen is permanently mounted above the chalkboard (as can be seen in the photo). This is a matte fabric which provides a wider viewing angle without picture distortion. A feltboard will be permanently mounted above one half of the chalkboard in such a way that it can be stored away when not in use, and quickly available when needed.

Traverse, flameproof draperies hang at the windows. These are of fiberglas with a plastic coating on the back to reinforce the drapery fiber, to help retain the shape, and to give a complete blackout for projection purposes. Ease of maintenance and practicality dictated the choice of drapery fabric.

Auxiliary Rooms

The *finishing room* has a work surface along one wall that is 30 in. wide and 12 ft. long. A sink with hot and cold taps for cleaning brushes and mixing stains is located

a complete list of tools and equipment for 24 students in a general shop teaching the six basic areas —

woodworking machines

Circular Saw, 10 in.
Including:
- 1 Motor, 1½ h.p., 3450 r.p.m., single phase, 115/230 v., 60 cycle
- 1 Extension cord and plug
- 1 Motor cover
- 1 Two pole, single phase heavy duty manual switch
- 1 Cable kit for switch

Accessories:
- 1 Combination blade, 10 in., ¾ in. arbor hole
- 1 Cross-cut blade, 10 in., ¾ in. arbor hole
- 1 Dado head, 13/16 in. capacity, ¾ in. arbor hole
- 1 Dado insert plate
- 1 Rip blade, 10 in., ¾ in. arbor hole

Wood Lathes, 2, 12 in.
Including:
- 2 Motors, ½ h.p., 1725 r.p.m., single phase, 115/230 v.
- 2 Safety stands
- 2 Motor hanger assemblies for safety stands
- 2 2 pole push switches for single phase, 110/220 v.
- 2 Switch mounting brackets
- 2 Wiring kits for switches

Accessories:
- 2 Outboard hand wheels for 12 in. wood lathe
- 6 3½ in. face plates
- 2 Screw centers
- 2 sets of turning tools, 8 tools per set
- 1 Disk sander, 10 in.
- 1 Jacobs drill chuck
- 1 Arbor
- 1 3-jaw universal chuck, 4 in.
- 1 4-jaw independent chuck, 4 in.

Band Saw, 10 in.
Including:
- 1 Motor, ½ h.p., 1725 r.p.m., single phase, 115/230 v.
- 1 2 pole push switch for flush mounting, single phase, 110/220 v.
- 1 Wiring kit for switch and safety stand
- 1 Safety stand

Accessories:
- 1 Miter gauge
- 1 Band saw fence

Jointer, 6 in.
Including:
- 1 Motor, ¾ h.p., 3450 r.p.m., single phase, 115/230 v.
- 1 Safety stand
- 1 2 pole push switch for flush mounting, single phase, 110/220 v.
- 1 Wiring kit for switch and safety stand

High Speed Drill Press, 15 in.
Including:
- 1 Motor, ½ h.p., 1725 r.p.m., single phase, 115/230 v.
- 1 Belt guard

Accessories:
- 1 Drill press lamp
- 1 Mortising attachment
- 3 Mortising chisels: (*a*) ¼ x ¼ in.; (*b*) ⅜ x ⅜ in.; (*c*) ½ x ½ in.
- 3 Mortising chisel bits: (*a*) ¼ x ¼ in.; (*b*) ⅜ x ⅜ in.; (*c*) ½ x ½ in.
- 1 Set of 6 depth collars, outside diameters: ⅞ in., 15/16 in., 1 in., 1 1/16 in., 1⅛ in., 1¼ in.
- 1 Set of 11 shaping cutters
- 1 Sash and door cutter
- 1 Shaping attachment
- 1 Drum sander, 2 5/16 in. dia., 3 in. high
- 1 Drill press vise
- 1 Set of 11 router bits
- 1 Rotary planer
- 1 Router bit adapter, rotary planer
- 1 Adapter for 3-wing shaper cutters for drill press

Grinder (Special)
Including:
1 Motor, ½ h.p., 1725 r.p.m.
Floor pedestal
1 Safety eye shield

portable, electric woodworking tools

1 Hand drill electric, ¼ in.
1 Hand sander, reciprocal
2 Portable jig saws
1 Router, hand, ⅞ h.p.; including base, light, wrench, guide, and bit assortment

woodworking hand tools

Awls
2 Scratch

Bits
13 Auger, #4 to #16
3 Dowel, #4, #6, #8
1 Expansive
2 Screwdriver, 5/16 in., ⅜ in.

Braces
3 Ratchet

Brushes
12 Bench duster, 10 in.

1 Burnisher

Calipers
2 Inside, 6 in.
2 Outside, 6 in.

Carving Tools (Basic Set)

Clamps
14 Adjustable hand: (*a*) 4, #5/0 (4 in.); (*b*) 4, #3/0 (6 in.); (*c*) 4, #0 (8 in.); (*d*) 2, #1 (10 in.)
12 Double bar, 3 ft.

Chisels
13 (*a*) 4, ¼ in.; (*b*) 2, 3/16in.; (*c*) 2, ½ in.; (*d*) 2, ⅝ in.; (*e*) 1, ¾ in.; (*f*) 2, 1 in.

2 Compass and Wing Divider Combinations

Countersinks
2 For brace
2 For 3-jaw chuck

Drills
2 Hand, (¼ in. capacity)
1 Jobbers drill stand, with straight shank high speed steel drills, 1/16 in. to ½ in. by 64ths

Files
3 Mill, 8 in.
2 Round, 8 in.
1 Three-square bastard, 8 in.
2 Second-cut, 8 in.
3 Mill, 10 in.
2 Half-round, 10 in.
1 Round, 10 in.
2 Surform
4 Cards, common wood
14 Handles, #2

Gauges
2 Bit, 2½ in.
4 Marking

Glue Dispensers
2 Plastic, 1 pt.

Hammers
7 Claw: (*a*) 4, 7 oz.; (*b*) 1, 13 oz.; (*c*) 2, 10 oz.

Knives
4 Sloyd, 3 in.
4 Putty, 1¼ x 2 in.

Mallets
2 Wood, 2½ in. face dia.

Nail Sets
6 2 each: 3/64 in., 1/16 in., 3/32 in.

Plane Irons
24 Single

Planes
6 Block, 6 x 1⅝ in.
4 Jack, 14 x 2 in.
2 Router
20 Smoothing, 9 x 2 in.

Pliers
2 Side cutting, 6 in.
4 Slip joint combination, 6 in.

Punches
4 Center: (*a*) 2, 3/32 in.; (*b*) 2, ⅛ in.

Saws
4 Back, 12 in.
1 Compass, 12 in.
2 Crosscut, 1 each: 8 pts., 10 pts.
1 Dovetail
1 Hack, adjustable frame
2 Rip, 5½ pts.

Scrapers
2 Cabinet
6 Hand, blades, 2½ x 5 in.

Screwdrivers
10 (*a*) 2, 1½ in.; (*b*) 3, 3 in.; (*c*) 3, 4 in.; (*d*) 2, 6 in.

2 Spoke Shaves

Squares
2 Bevel, 8 in.
1 Combination, 12 in., with 1 center head and 1 protractor head
2 Steel, 24 x 16 in.
24 Try, 8 in.

Trammel Points
1 3 in.

metalworking machines

2 Metal Lathes
Including:
2 Motors, 1 h.p., 1725 r.p.m.
2 Switches
Accessories:
4 Toolholders: (*a*) 2 straight; (*b*) 1 right; (*c*) 1 left
2 Straight slant cut-off tool holders
1 Offset cut-off tool holder
1 Boring bar holder
1 Knurling tool holder
7 Lathe dogs: (*a*) 2, ½ in.; (*b*) 2, ¾ in.; (*c*)2, 1 in.; (*d*) 1, 1½ in.
1 Steady rest
1 3-jaw universal chuck
1 4-jaw independent chuck
1 Jacobs drill chuck
1 Arbor for drill chuck
1 Draw-in collet chuck
1 Collet rack
16 Collets, 1/16 in. to 1 1/16 in.
1 Plain taper attachment, mounted on lathe

Vertical Milling Machine
Including:
1 Motor, ½ h.p., 1725 r.p.m.
1 Switch
Accessories:
7 Collets: 1/16 in., 3/16 in., ¼ in., 5/16 in., ⅜ in., 7/16 in., ½ in.
6 Spiral end mills, ¼ in. dia., r.h.
4 Spiral end mills, ⅜ in. dia., r.h.
4 Spiral end mills, ½ in. dia., r.h.

Sheet Metal Machines
1 Shear, with hold down bar and safety guard, 36 in.
1 Roller, 24 in. width, 20 gauge capacity
1 Box and pan brake, 24 in. width, 16 gauge capacity

Grinder
½ h.p., 3450 r.p.m. motor
Including:
1 Floor pedestal
1 Safety eye shield

Drill Press, 15 in.
Including:
1 Motor, ½ h.p., 1525 r.p.m.
1 Belt guard
Accessories:
1 Drill press vise

metalworking tools

Anvil
1 100 lb.

Anvil Stand
1 #10

Awls
4 Scratch

Buffer
1 ½ h.p. motor, 3450 r.p.m., 115 v.
1 Pedestal, cast iron

Calipers
2 Inside, 6 in.
2 Outside, 6 in.

Cold Chisels
2 Cape, ¼ in.
4 Common, ½ in.

Clamps
10 C clamps: (*a*) 4, Super Jr. Pony; (*b*) 2, 3 in.; (*c*) 2, 5 in.; (*d*) 2, 8 in.
6 Handy spring clamps: 2 each, #1, #2, #3
6 Ring clamps, "B"

Clippers
1 Bolt, 3/16 in. capacity

Countersinks
2 60°, ¼ in. shank

Dapping Die
1 Set, iron
1 Set, punches and cutters, 30 pieces in set

Dividers
4 Wing: 2 each, 4 in. and 8 in.

Dressers
2 Wheel

Drill
1 Hand, ¼ in. capacity

Drills
1 Jobbers drill stand, with straight shank high speed steel drills 1/16 in. to ½ in. by 64ths

Files
2 Mill bastard, 8 in.
2 Round bastard, 8 in.
2 Half-round bastard, 8 in.
1 Three-square bastard, 8 in.
1 Three-square second-cut, 8 in.
3 Mill bastard, 10 in.
1 Round bastard, 10 in.
2 Half-round bastard, 10 in.
6 File cards, common wood

Foundry
1 Bellows, molders, 8 in.
1 Bulb sponge, 4 oz., with camel hair brush
1 Crucible furnace, including blower, lid, derrick for lifting lid
2 Crucibles, #8
1 Crucible tongs, 17 in.
2 Flasks, steel foundry, 10 x 12 in., 4 in. cope and 4 in. drag
1 Ladle, bottom pour; capacity, 4½ lb. of lead
1 Ladle, melting, 3 in. dia. bowl
2 Lifters ¾ in. x 12 in.
1 Pyrometer, Lance type, portable, complete with thermocouple
1 Riddle, 18 in. dia., wire screen 16 mesh to the in.
2 Slick and oval spoons, ¾ in.
2 Spoon and gate cutters, 1 in.
2 Trowels, square moulders, 1¼ x 6 in.

Furnace
1 Bench, combination

Gauges
2 Drill point grinding
1 Screw pitch
1 Surface, universal, 3 in. base, 9 x 12 in. spindle
1 Wire — nonferrous
1 Wire — steel

Groovers
3 1 each: #0, #2, #4

Hammers
- 8 Ball pein: 4 each, 12 oz. and 8 oz.
- 2 Blacksmith, hand, 40 oz.
- 4 Chasing
- 1 Embossing
- 3 Planishing
- 3 Riveting, 8 oz.
- 3 Setting, 12 oz.

Mallets
- 6 Buckskin fiber
- 12 Forming and embossing

Pliers
- 1 Adjustable, "water pump"
- 1 Curved nose, 5½ in.
- 2 Diagonal, 6 in.
- 1 End wire cutters, 10 in.
- 2 Needle nose, 6 in.
- 2 Side cutting, 6 in.
- 2 Slip joint combination, 6 in.

Punches
- 4 Center: 2 each, 3/32 in. and 1/8 in.
- 1 Drift, ¼ in.
- 4 Tinners, hollow: 1 each, ½ in., 5/8 in., ¾ in., 1 in.

Rivet Sets
- 2 1 each #5 and #8

Rules
- 2 Steel, 3 in.

Saws
- 3 Hack, adjustable frame
- 4 Jewelers, wood handles, adjustable, 6 in. depth and 3½ in. depth, thumbscrew blade clips

Screwdrivers
- 7 (*a*) 2, 1½ in.; (*b*) 2, 3 in.; (*c*) 2, 4 in.; (*d*) 1, 6 in.
- 3 Phillips head: 1 each, #1, #2, #3

Screw Plate
- 1 1/8 in. to ¼–20, complete with die stock and tap wrench
- 1 4–36 to ¼–20, N.C. and N.F., complete with die stock and tap wrench

Seamer
- 1 hand

Shovel
- 1 Square point, #4

Soldering Coppers
- 8 4 each, 2 lb. and 1 lb.; including handles

Stakes
- 1 Blow horn
- 1 Double seaming
- 1 Round head
- 1 Square bevel edge
- 1 Square common

Stamps
- 1 Set, metal, 1/8 in. figures

Squares
- 4 Combination

Tin Snips
- 1 Aviation
- 1 Curved, 3 in.
- 1 Hack bill
- 4 Straight, 3 in.

Tongs
- 1 Curved leg blacksmith tongs, 20 in. long, to hold 3/4 in. stock
- 1 Straight blacksmith tongs, 20 in. long, to hold 3/4 in. stock

Tools
- 1 Set, backgrounding and decorating, 18 tools to set
- 1 Set, backgrounding and decorating, "cut B"
- 1 Set, chasing

Trammel points
- 1 Set

V-Block
- 1 Set, Starrett

Welding — Arc Welding
- 1 100 amp. arc welder, including hand shield with lens, "Selfweld" holder, "Selfweld" electrodes, soldering carbon and adapter

Welding — Gas Welding
- 1 Torch Wyp tip cleaner
- 2 Airco spark lighters
- 1 Renewal flint
- 1 Combination chipping tool
- 1 Vise grip welding clamp, adjustable up to 1 3/16 in., # 9
- 1 Cylinder truck, for welding tanks

Wrenches
- 2 Adjustable: 1 each, 8 in. and 12 in.
- 1 Pipe, straight, 10 in.

electrical tools and equipment

1 Laboratory Magnet Set
1 Wire cutter and Crimper
1 Continuity Tester
6 Line Testers
2 Fuse Pullers
1 Multimeter
3 Instant Heat Soldering Guns
2 Diagonal Cutting Pliers
2 Long Nose Pliers
1 Long Curved Nose Pliers
1 Electrician's Scissors
1 Nut Driver Set

leather tools

Awls
- 6 Scratch

Beveler
- 1 Edge

Boards
- 12 Cutting
- 8 Jeweler's rouge

Brushes
- 6 Glue
- 4 Dye

Chisels, Thonging
- 7 4-prong: (*a*) 6, 3/32 in.; (*b*) 1, 1/8 in.
- 4 1-prong: (*a*) 3, 3/32 in.; (*b*) 1, 1/8 in.

Creasers, Edge
- 2 1 each, #1 and #4

Dividers
- 1 6 in.

Edge Tool
- 1 Common, #5

4 Fids

Knives
- 10 Bevel point

Marble Slab
- 12 1 in. thick

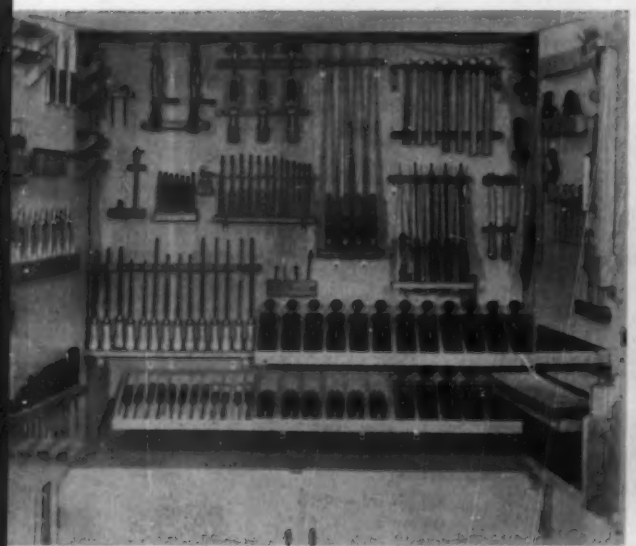
Markers
- 2 space: 1 each, 5 and 7 stitches

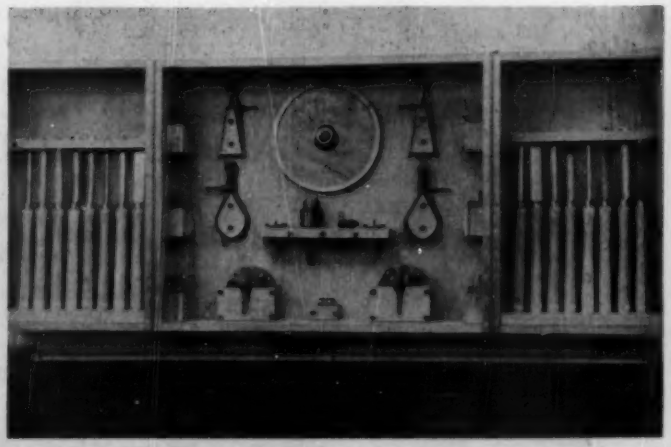
Modelers
- 3 Ball-end
- 3 Deerfoot
- 12 #4771

Mallets
- 6 Hickory or rawhide

Punches
- 2 Revolving, 6 tube

Needles
- 1 package, Glover's
- 24 Lacing





Left: the hand woodworking cabinet, equipped for 24 students, has a storage cabinet for nails, etc., below. Above: specialized tools — like these for wood lathe turning — are mounted in wall cabinets.

Set
1 For attaching snap buttons

Setters
2 Eyelet

Squares
10 Steel, 12 x 1 x 7 x 1 in.

8 Tracers

drawing tools and equipment

1 Pencil Pointer
Pencil Sharpener
1 Draftsman's point

Print Machine
1 Moist process, using Diazo paper, including stand

T Squares
24 Professional quality, 18 in., maple blade and head

copper enameling tools and equipment

1 Atomizer
6 Brushes, artist #2
2 Forks
1 Hot plate, electric
1 Kiln; chamber size 8½ x 8½ x 4 in.; including: pyrometer, pilot light, and input control switch
4 Knives, artist pallet
1 Rack, firing
1 Sieve, 80 mesh
4 Spatulas
4 Tweezers

general craft tools

Heater
1 Plastic strip, 21 in.

Pliers
1 Set of 5, jewelers

Saw, Circular
1 For plastics, 10 in. dia., ¾ in. arbor hole

1 Vibro-Tool Kit
Woodburning Sets
2 Complete

Heating Elements
2 Replacement, for woodburning tools

general tools and equipment

1 Blackboard Compass

1 Blackboard Set

Oil Cans
10 ½ pint, 6 in.

Air Hoses
2 25 foot, with nipples and couplers
3 Sherman air nozzles

Waste Cans
2 For oily rags, 10 gal., with foot lever

Spray Booth
Leg type paint arrestor; 3 ft. wide inside, 4 ft. high inside, 3 ft. 6 in. working depth, 5 ft. 2 in. overall depth. Complete with paint arrestor filter bank, 24 paint arrestor filter pads, manometer, exhaust fan, exhaust duct, exhaust fan motor

Spray Equipment
1 PHLE-501, air condenser and regulator
1 PJGA-502, #30 EX spray gun
1 PKR-550, 1 quart suction feed cup
1 Air hose: 8 ft., 5/16 in. i.d., with PHC-4527 connection on one end and HC-4511 quick detachable connection on the other end
2 PHC-4416, quick detachable stem
1 PDGB-501, air dusting gun
1 PTGA-501, #90 F spray gun for touch-up
1 PC-538, 6 oz. metal cup attachment
1 AD-404, adapter for cup
1 PHC-4416, quick detachable stem

general shop machine motor specifications

Woodworking Machines
1 Circular saw, 10 in.
Motor: 1½ h.p., 3450 r.p.m., single phase, 115/230 v.
1 Band saw (wood)
Motor: ½ h.p., 1725 r.p.m., single phase, 115/230 v.
2 Wood lathes
Motors: ½ h.p., 1725 r.p.m., single phase, 115/230 v.
1 Jointer, 6 in.
Motor: ¾ h.p., 3450 r.p.m., single phase, 115/230 v.
1 Drill press (bench type)
Motor: ½ h.p., 1725 r.p.m., single phase, 115/230 v.
1 Grinder, pedestal type
Motor: ½ h.p., 1725 r.p.m., single phase, 115/230 v.

Metalworking Machines
2 Lathes (metal)
Motors: 1 h.p., 1725 r.p.m., single phase, 115/230 v.
1 Vertical mill
Motor: ½ h.p., 1725 r.p.m., single phase, 115/230 v.
1 Drill press (bench type)
Motor: ½ h.p., 1725 r.p.m., single phase, 115/230 v.
1 Grinder, pedestal type
Motor: ½ h.p., 3450 r.p.m., single phase, 115/230 v.
1 Band saw (cut off)
Motor: ⅓ h.p., 1725 r.p.m., single phase, 115/230 v.
2 Buffers
Motors: ½ h.p., 3450 r.p.m., single phase, 115/230 v.

Portable Tools
2 Jig saws
Motors: ⅛ h.p., 110 v.
1 Reciprocating sander
Motor: ⅛ h.p., 110 v.
1 Hand drill
Motor: ⅛ h.p., 110 v.
1 Saber saw
Motor: ⅛ h.p., 110 v.
1 Router
Motor: ¼ h.p., 110 v.
1 Kiln, 15 amp., 115 v.

power mechanics motors

Motor, vertical power, outboard, 5 h.p., two-stroke cycle, display cutaway
Motor, horizontal power, utility, 2.5 h.p., four-stroke cycle
Motor, vertical power, lawnmower, 1.5 h.p., two-stroke cycle, display cutaway

total cost and equipment of tools by area —

Woodworking Machines, 2255.79
Woodworking Tools, Portable, Electric, 261.20
Woodworking Hand Tools, 855.32
Metalworking Machines, 6165.44
Metalworking Hand Tools, 1675.51
Electrical Tools and Equipment, 97.79
Leather Tools, 107.90
Drawing Tools and Equipment, 1049.28
Copper Enameling Tools and Equipment, 100.05
General Craft Tools, 77.10
General Tools and Equipment, 797.63
Motors for Power Mechanics Area, 70.00

TOTAL COST OF THE GENERAL SHOP $25,697.24

cabinets

2 General Storage Cabinets
4 Units — Student Work Center Cabinets
Including:
6 seats and 6 drawing boards to a unit, with combination vise and storage space for each student

1 Moulding Bench
9 Auxiliary Work Benches
2 Finishing room
1 Woodworking
6 Metal area
1 Welding Bench
1 Sheetmetal Bench
1 Wardrobe and General Storage Cabinet
1 Hand Woodworking Tool Cabinet
1 Hand Metalworking Tool Cabinet
1 Chalkboard Assembly
1 Case for Illustrative Materials and References
1 Demonstration Bench
1 Portable Work Counter
1 Electrical Test Bench
1 Wash-up Sink
1 Leather and Plastics Bench
1 Glue and Clamp Bench
1 Teacher's Desk
1 Teacher's Chair (Desk)
24 Tablet Arm Chairs

at one end. There are two 4-ft. benches below the work surface for storage, and between the benches under the work surface is additional storage space. A metal cabinet holds all finishing materials. Plans call for the installation of a three-foot, leg-type spray booth for which exhaust outlet and electrical conduit are already in place.

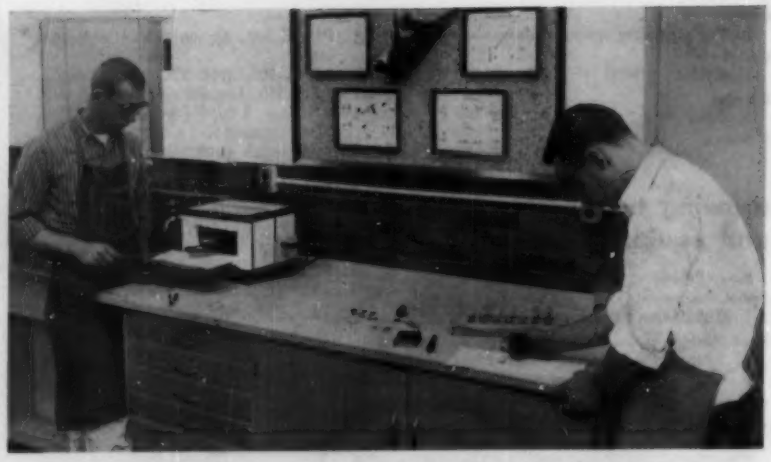
The *storage room* was planned for projects that are too large to be stored elsewhere. In the rear are two locked cabinets for storing surplus materials and tools. The area below the stairway to the balcony is completely enclosed. The door has a special lock. The area is used for storing engines and outboard motors used for power-mechanics instruction.

The *lumber storage* and *glue areas* were located inconspicuously for neatness but in such a way that these would be convenient for use. Space behind the lumber racks provides for vertical storage of plywood.

Balcony

The balcony is equipped with tablet arm chairs. It serves as a lecture area. The chairs will be replaced with large tables and chairs and the area converted to space for planning. The teacher's desk and person file are also located on the balcony as is the copy machine and paper for print making.

The shop is in constant use for various kinds of industrial arts teaching activities. Part of the day it is used for professional classes in industrial design, general shop and unit courses in drawing and planning, arts and crafts and woodwork. In addition, the staff is utilizing the new general shop to carry out research into the content, teaching methods and organization best suited to the teaching of general-shop activities.



Above: metal enameling at the arts and crafts bench. Below: welding and foundry, two hot-metals activities.

Left: modern machine tools: two lathes, a vertical miller, a drill press, and a grinder. Above: a demonstration about an outboard motor in the power mechanics area.

▶ how a consultant helps design efficient, economical shops —

Role of the Consultant

in vocational and industrial arts planning

W. K. DUNTON

Because vocational and industrial arts facilities on a square foot or cubic foot or per pupil basis cost more than ordinary classrooms, they are sometimes called expensive. But they can be built economically.

Economy does not mean cheapest. Economy means getting maximum value. There are three essentials to achieving economy in school shop construction. One is to do a thorough job of educational program planning. Another is to develop sufficiently comprehensive educational specifications. The third is to scrutinize the educational program and the educational specifications from a practical point of view with the aim of getting maximum educational value for each dollar spent.

The educational planning must be based on community needs. The educational specifications must include all the information needed by the architect to develop an adequate, efficient, economical design. And every item must be scrutinized for its educational value.

For most school administrators and shop teachers, shop planning is a once-in-a-lifetime event. Graduate courses notwithstanding, much local level lay-staff planning committee work can be classed as unguided study by a group of amateurs. Amateurs, not at school administration or vocational and industrial arts education, but at the job of developing educational specifications. Staff participation is essential, but because of limited or biased experience, distorted program values of obsolete attitudes, needs to be guided by a competent and experienced consultant.

Function of the Consultant

According to the 27th Yearbook of the American Association of School Administrators, many boards of education have recognized the desirability of employing an educational consultant. The educational consultant does not assume the functions of the architect. According to the Yearbook, "The consultant is a professional educator, trained and experienced in school administration. He has acquired a technical understanding of the relationship of the needs of the educational program and of the community to the school plant. He should have competence in the educational applications of much technical data and should be able to reflect in planning the experience to be gained through maintenance and operation of school plants. Also, he has skill in planning the internal arrangements of all parts of the school building so that effective operation may be secured. If properly qualified, he will be of immeasurable assistance."

The Commission also suggested that "in employing an educational consultant, consideration should be

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given to the experience of the consultant in school administration, the amount and quality of his experience and education in school building planning, his contributions to building research and literature, and his personality."

The role of the consultant as presented in this article is based on the premise that the designing of a building, a shop, or a laboratory is not the function of a consultant. Educators who pose as design experts and architects who pose as educational specialists should be looked upon with equal distrust. Most examples of poorly planned facilities are the result either of educators playing architect or of architects being forced, by lack of information, to play educator. It is the function of the educator to plan the program. It is the function of the architect to design the facility to house the program. It is the function of the consultant to lead the school personnel in their program planning and in their development of the educational specifications.

In describing the shop planning consultant's leadership function, it should be noted that his work does not take the place of the over-all school building survey often made of an entire district by teams of educational consultants from universities. He usually works closely with such teams but in that relationship should be considered an auxiliary consultant. His most important help to the general consultant is in the area of determining the operating capacity of the building.

His most important contribution to the local staff is in helping them determine the answers, or the best methods of securing the answers, to certain basic questions; questions that must be answered if the educational specifications developed are to provide the architect all the information he needs to design an efficient, economical facility.

Modern Planning Practice

A generation ago it was common practice to begin the educational planning of shops by drawing a layout showing space and equipment. Unfortunately, in some cases this practice is still followed. Good planning practice today, however, emphasizes the development of complete educational specifications before the first line is drawn on paper. Educational specifications have been defined as: *An analytical description of the purpose, method and organization of the educational program of a community prepared as a guide to the planning of educational facilities.* Such a definition is equally applicable to shop programs and shop facilities as part of the total. Educational specification preparation is a complex job on which the local staff ordinarily requires guidance. The following material describes problems on which help is needed. The examples are of schools where the educators were highly competent in their fields but lacked experience in planning or knowledge of the techniques of educational specification development. The sequence followed is that of typical educational specifications.

Determining Community Needs

Determining community needs is not simple. Where to secure the necessary data and how to interpret it are major problems to the inexperienced. A city was once visited where the school person responsible for determining the needs for apprentice training did not even know the location of the Central Labor Council hall or the names of any union or contractor organization officers. Vocational agriculture shops with wood turning lathes not necessary for the program are commonplace. Because of the influence of tradition, many industrial arts programs include only woodworking and mechanical drafting. Such situations as these indicate lack of correlation between community needs and facilities.

Program Policies

To determine and secure formal approval of *policies regarding the program* is sometimes a difficult problem. Once the architect asked for help on the layout of trade shops for a system that had not decided if there was to be a co-op program for senior boys or if the training was to be provided in the school shops. Such help cannot be given. Only after the planned program is given official approval can effective facility planning begin.

Philosophy Adoption

The *adoption of a philosophy* of industrial arts or of trade and industrial education, or of industrial education is sometimes deferred until after a building is complete. This may seem inevitable when the planning is done before the staff is employed. But a facility cannot be satisfactorily planned unless the purposes it is to serve are defined. If the subject of automotive mechanics is taught from the consumer viewpoint, then the physical facilities needed are quite different from those required for the skill training of auto mechanics. The decision regarding whether industrial arts shops are to be unit, or general, or unit-general must be made before they can be designed.

Group Characteristics

The determination of the *group characteristics of the students* to be served poses an important and sometimes overlooked problem. The staff of a new $8,000,000 vocational high school recently faced a crisis in this connection. The building was planned to house 3000 above-average students preparing for entrance into technical occupations and skilled crafts. When 800 slow learners, who had previously attended special classes, were included in the group initially assigned to the building, it became obvious that the facilities were not planned to meet their needs and would not permit the type of program required for slow learners.

Projection of Enrollments

The *projection of probable enrollments* involves many different factors and is a most complex problem. The usual school building survey report includes grade-level projections based on birth records, attrition rates, and probable annexations or consolidations. However, the ordinarily used subject enrollment coefficients seldom apply accurately to industrial arts, and almost never to vocational education. These enrollments depend more upon community needs and program organization. One city planned a new six-year high school's shops for a program that did not include the eighth grade. During construction a decision was made to include the 180 boys in this grade. Facilities became inadequate before they were complete.

Program Organization

Difference in types of *program organization* vitally affect shop planning. The question of single or double periods for industrial arts must be resolved before any one of several basic facility problems can be solved. The number of periods of related instruction daily for vocational subjects must be known. The time of day facilities that will be used by apprentices must be established. All these relate to the number of teaching stations required. Yet one of the most widely read books on school building planning states — regardless of the type of program or organization — "there should be one classroom for each four shops." That could be one too many, or three too few.

Method of Instruction

The *method of instruction* to be

(Continued on page 80)

▶ an historical analysis of the issues involved in the development of the unit and general shop –

One stage in i-a development: a ninth-grade class in woodworking at the Washington Irving school in Roslindale Mass.

Shop Organization in Industrial Arts

ROBERT G. HAMMOND

An analysis of literature on shop organization as an element in industrial arts education leads to the following conclusions:

1. The evolution of shop organization in industrial arts cannot be considered apart from the evolving philosophy and interpretation of the subject as an integral part of the school program; and,

2. even though there have been two basically different types of shop organization generally proposed in industrial arts, only in one has there been much diversity of individual thought and expression.

The Unit Shop

The unit shop is the oldest of the two types and, historically, dates back to the introduction of manual training shops in America. Such shops, as introduced into the United States, contained equipment for and offered instruction in only one activity involving the use of but one material (forging, foundry, machine shop, patternmaking, etc.). It was in such shops that the selected and carefully graded exercises of the Russian system, and the useful projects of Sloyd were completed. Within this type of shop organization the arts and crafts movement brought about improved design in manual arts construction.

Factors in General Shop Development

The second of the shop organization forms in industrial arts, the general shop, is the outgrowth of several forces in education. Among the most prominent of these was the feeling that work in a unit course in woodwork or mechanical drawing, as inherited from the manual training era, was too formal and confined. The industrialization of manual training, with the resulting broadened objectives and enriched content of the subject, clearly emphasized the dissatisfaction of educators in the formal type of shopwork which confined

Dr. Hammond is associate professor of industrial education at the Northwestern State College in Natchitoches, La.

"The evolution of shop organization in industrial arts from the evolving philosophy and interpretation

the experiences of pupils to one common area of work and, thus, excluded the possibility of combining various shop activities into the production of one completed article.

A second force in the development of the general shop was the demand for socialized courses in the public school. Bedell[1] called attention to the demand that students develop desirable social traits of behavior as well as acquire skill and technical knowledge. He visualized the general shop as a means of meeting both requirements without detriment to either.

A third factor, which, if not serving to introduce the plan, certainly aided in the growth and popularity of the general shop, was the inability of the smaller schools to provide unit shop equipment and instruction in a number of areas. This need was emphasized, as Ericson later wrote, because ". . . in small schools where only one or two teachers and shops can be justified, it is not reasonable to limit students to one or two craft activities."[2]

A fourth and most important force was the movement to establish the junior high school and the subsequent recognition of the need for providing exploratory and developmental types of experiences for children of this age. Mays[3] recognized the intimate relationship of the general shop idea to that of the junior high school when he wrote:

> . . . it seems clear that originally the general shop was little more than the industrial-education phase of the junior high school movement. The educational theories that brought to birth the junior high school also produced the demand for some kind of program of diversified shop experiences for junior high school pupils.[4]

In the same article, he expanded this concept

Throughout the history of the junior high school to the present a major emphasis seems to have been "exploration," and it is, therefore, not surprising in the early diversified programs of shop experiences that later came to be called "General Shops."[5]

There were several early applications of this idea. The emphasis in all of these curriculum endeavors centered largely on the general shop concept of providing a diversity of industrial activities.

Early Experiments

Mays also pointed out in the historical treatment of the general shop that the use of the term has a vague origin and ". . . it is extremely difficult to discover its first use."[6] It is apparent, however, that the original idea, if not the name, goes back to at least 1913. It was in that year that Charles A. Prosser, in discussing the topic of the practical arts and vocational guidance, reasoned that, if the practical arts were to have any guidance value for youth, they must be varied from the narrow courses in woodwork or metalwork and be more diverse in nature. "What we need," he said, "is . . . an organization of training in the practical arts during the seventh and eighth years which will include experiences drawn from many different fields of employment. . . ."[7] In connection with this training he advocated individual jobs taken from all the fields and assigned in an indiscriminate manner. He saw no reason for requiring all the students in the class to work upon the same kind of a job at the same time. Nor did he feel ". . . that they should be working upon different jobs from the same field of industry at the same moment."[8]

When writing later about the "Industrial-Social Theory" of Drs. Russell and Bonser, Snedden and Warner pointed out that as a result of the experimentation at Teachers College ". . . there was created a new type of shop known as a general or composite industrial shop or laboratory."[9]

In an address before the Eastern Arts Association in 1916, Bonser called for a new type of shop to be used in the junior high school industrial arts program. He advocated a large shop equipped with a great variety of tools and machines representing whatever forms of industrial work the community seemed to warrant. In the same address, he advanced the concept that ". . . in general it may be safely offered as a guiding principle that the larger the field of inquiry opened up by the making of a project the more valuable the project."[10] This concept was one which was to be advocated a great many times but which has seen little application through the years following.

An early experiment conducted by Stout Institute, in co-operation with the public schools of Menomomie, Wis., as described by Rodgers,[11] called for a series of 16 short unit introductory industrial courses for grades seven to ten. Projects and problems typical of the best commercial practices, involving tool processes and operations, related technical information, and vocational information, were offered for the purpose of acquainting students with a large number of industrial occupations at a rather early period in their lives.

Bowman[12] suggested that smaller junior high schools offer boys nine or ten week tastes of four different activities per year. He recommended that woodwork, concrete, printing, drawing, metalwork, and a general or "around the shop" course (simple repairs, construction, and electrical work) be used as areas of instruction. In the same article he noted

[1]Bedell, Earl L., "The General Shop Idea," *Industrial Arts & Vocational Education*, 20:205, July, 1932.

[2]Ericson, Emanuel E., *Teaching the Industrial Arts* (Peoria: The Manual Arts Press, 1946), p. 303.

[3]Mays, Arthur B., "Notes on the Historical Aspects of the General Shop," *Industrial Arts & Vocational Education*, 39:139, Apr., 1950.

[4]Proffitt, Maris M., *The General Shop*, United States Department of Interior, Education Bulletin 1929, No. 30 (Washington: Government Printing Office, 1929). Letter of Transmittal.

[5]*Loc. cit.*

[6]*Ibid.*, p. 141.

[7]Prosser, Charles A., "Practical Arts & Vocational Guidance," *Manual Training Magazine*, 14:217, Feb., 1913.

[8]*Ibid.*, p. 218.

[9]Snedden, David, and others, *Reconstruction of Industrial Arts Courses* (New York: Bureau of Publications, Teachers College, Columbia University, 1927), pp. 7–8.

[10]Bonser, Frederick G., "Industrial Education in Present School Problems," *School & Society*, 4:321, Aug. 26, 1916.

[11]Rodgers, R. H., "Introductory Industrial Courses, *Industrial Arts Magazine*, 5:193–195, May, 1916.

[12]Bowman, Clyde A., "Industrial Education for the Smaller Community," *Manual Training Magazine*, 18:177–180, Jan., 1917.

cannot be considered apart

of the subject as an integral part of the school program..."

that Teachers College, Columbia University, was equipping a demonstration shop for junior high schools on such a plan.

Criticism of the General Shop

The term "general shop," while probably in wide use prior to 1922, was first used in a title of a magazine article in that year.[13] By the end of the first quarter of the century, considerable discussion and controversy concerning the relative merits of the general shop had taken place among the industrial arts leaders. Griffith[14] saw no advantage to either the single subject or to the combined course, and he suggested that the manual training teacher let the nature of his equipment determine his practice. Selvidge as early as 1923 noted a disadvantage to the general shop that would often be referred to through the years. It is a valid criticism of many general shops:

> The trouble with the general shop is that it too often represents general disorder. Usually the teacher does not have a definite list of the things he wishes to teach, and he does not have his instruction material so organized that he can carry on individual instruction on a wide variety of work at the same time.[15]

Charles A. Bennett's report on the meeting of the Manual-Arts Conference of the Mississippi Valley in 1923 indicated that the general shop was taken to task by some of the members present. He reported that in the discussion concerning the general shop the statement was made ". . . that at its best, today, the general shop reduces teaching to assigning problems and checking results and at its worst it is damaging chaos."[16] He went on to note that the conference felt that the general shop could be made effective, but that it was not so at that time.

The same year brought added confusion in terminology with reference to the general shop. Earl L. Bedell, in 1923, published two articles concerning the general shop[17] which gave considerable emphasis to the concept that the term general shop referred to the physical form of the shop and its equipment, and not to any specific course of study that might be taught in that type of shop arrangement. At least one writer[18] has made the interpretation that Bedell used the two terms — general shop and household mechanics — synonymously. It seems quite clear, however, that Bedell first conceived of the general shop as "the place" in which a course called household mechanics was taught. This latter view seems to be substantiated by the following statement:

> The term general shop is used to designate a shop with equipment for carrying on work in more than one line, in contrast to the ordinary manual training shop equipped with only those things necessary for woodwork. The shop in which household mechanics is taught is a general shop in this sense.[19]

Bedell later defined a general shop as ". . . a shop in which a variety of stations or places to work are provided." He went on to say that: "The course of study to be taught in a general shop dictates the lines of equipment at the various stations."[20]

Struck was among those who followed along with the idea of the general shop as a "place" to teach, and in 1926 he referred to the term general shop as meaning a type of shop layout and organization and ". . . not as is sometimes thought to be a distinct type of education."[21]

Despite such controversy and agitation as there may have been among the industrial educators of the day concerning the introduction of the general shop and its relative merits compared to the unit shop, the general shop was in considerable favor by 1925. There was a rapid growth in the number of general shop programs introduced into the schools, especially for the junior high school and for the smaller school where only one shop could be provided.

Current Viewpoint

With this growth there gradually came into existence the currently accepted viewpoint of what the term general shop means. Newkirk and Stoddard,[22] in a book published in 1929, noted that the term general shop, in the beginning, was chiefly used in referring to a shop arrangement which provided for more than one activity to be carried on simultaneously under the direction of one teacher. They described the content and equipment as being lifted bodily from a series of unit shops and being pared until it would fit into one room.

In the same publication the authors noted the appearance of a new concept in which the general shop was no longer thought of as being analogous to a series of unit shops but rather as the combination of a broad group of industrial arts activities fitted together in such a manner as to present a unified, "live" core of content which will meet the educative needs of the pupils. They defined the general shop as:

> . . . a broad group of educative industrial-arts activities embracing techniques of shop organization and teaching methods which enables a community, whether large or small, to present a unified core of content, based on life needs, as summarized in these aims: developmental experience interpretive of the major phases of the world's industrial work, 'handy-man activities,' consumer's knowledge and appreciation, guidance, hobbies, social habits, and (for a very small per cent) vocational preparation.[23]

[13]Howell, Clarence, "The General Shop," *Industrial Arts Magazine*, 11:261, July, 1922.

[14]Griffith, Ira S., "The Field of Manual Arts in Terms of Present Needs," *Manual Training Magazine*, 21:4, Sept., 1919.

[15]Selvidge, Robert W., "The Real Job," *Industrial Education Magazine*, 25:37, Aug., 1923.

[16]Bennett, Charles A., "Editorial Comment," *Industrial Education Magazine*, 25:207-208, Feb., 1924.

[17]Bedell, Earl L., "Household Mechanics and the General Shop," *Industrial Education Magazine*, 25:14-16, July, 1923, and "Methods of Teaching in the General Shop," 25:38-41, Aug., 1923.

[18]Mays, Arthur B., "Notes on the Historical Aspects of the General Shop," *Industrial Arts and Vocational Education*, 29:141, Apr., 1950.

[19]Bedell, Earl L., "Household Mechanics and The General Shop," *Industrial Education Magazine*, 25:16, July, 1923.

[20]Bedell, Earl L., "The General Shop Idea," *Industrial Arts & Vocational Education*, 20:206, July, 1932.

[21]Struck, F. Theodore, "Developments in Industrial Arts Education," *Industrial Arts Magazine*, 15:302, Sept., 1926.

[22]Newkirk, Louis V., and George D. Stoddard, *The General Shop* (Peoria: The Manual Arts Press, 1929), pp. 5-6.

[23]*Ibid.*, p. 11.

In the same year Bedell indicated a revised concept of the general shop when he suggested to teachers of multiple-activities courses that they view the general shop not as an assembly of separate courses but as a combination of several courses integrated into one with a definite purpose. The work, he said, ". . . should be undertaken with the idea that it is a single course of study."[24]

It is interesting to note that in the quarter-century since the general shop was first conceived as a unified purposeful course of study, rather than as a shop organization plan, no radical changes have taken place in its definition, characteristics, or objectives. Typical of the more recent comments concerning the general shop were those of London. He wrote:

> A composite general shop is not four or five shops in one, but rather a shop in which the subject matter experiences have been selected from different phases of industry, on the basis of interest, relative importance, and suitability for school shop purposes, and organized into a unified program.[25]

Many Variations Still Exist

We should not be led to believe, however, that the acceptance and continued usage of the term general shop in referring to a course of study rather than to an organizational pattern has led to any corresponding singleness of practice within the course itself. Many variations continue to exist within the general pattern of the course and under the name general shop. Selvidge made note of a similar situation as early as 1931. He mentioned that the term seemed to be applied to a great variety of work, and to many different types of organization, and he predicted with uncanny accuracy that: "It is very doubtful whether we shall find any common agreement as to the meaning of the term, or what it describes."[26] Recently published state department of education bulletins and other materials infer that it is not feasible to publish a general shop course of study that would be applicable to all teachers in all situations, but that the content, type of organization, and the procedure followed in handling the class will likely vary considerably, depending upon the basic philosophy of the individual teacher. It is usual to find in suggested courses of study for the general shop that the teacher must choose from suggested organizational patterns, methods, subject areas, and activities, those best suited to meet the objectives of his course, and for which there are adequate time and shop facilities provided.

The growth in popularity of the general shop was reported in 1927,[27] and again in 1940.[28] A prediction made in the latter report forecast that the general shop would continue to show progress in the years ahead. This prediction has come true in that the general shop has grown in nationwide enrollment in the public schools to a point unequalled, not only by other industrial arts courses but by any other subject in the practical arts classification[29] (agriculture, business education, home economics, and industrial arts). Seemingly the reasons listed for the past growth and popularity of the general shop are no less valid today and should cause continued growth and expansion. The reasons given were:

> The general shop form of organization: (*a*) Provides for a variety of media and consequently of activities for pupil experiences in manipulative work for self-expression and exploratory values; (*b*) provides an excellent opportunity for acquiring, in a realistic way, information about industry and our industrial society; (*c*) offers a large variety of activities that make it more nearly possible to provide pupils with experiences in accordance with their interest and developmental levels than does the unit shop; (*d*) accords well with the educational objectives and principles underlying the organization of the junior high school, in which the industrial arts work is now generally required the first two years; and (*e*) makes it administratively possible — due to the form of organization and content of instruction that characterizes the general shop — to offer industrial arts in a larger number of communities than would otherwise be possible.[30]

Support of the Unit Shop

We should not think, however, that the unprecedented success and present high favor of the comprehensive general shop form of shop organization has removed all thoughts of other organizational patterns from the thinking of the industrial educator. This has not occurred, nor is it likely to do so. As Bedell wrote in 1928: "The general shop will not supplant the unit or single activity shop; the unit shop will always have a function to perform in many schools."[31] Dr. Homer J. Smith was even more explicit. He wrote in 1934: "I believe in individual shops wherever they can be financed. I believe in the general shop as something to provide when you can't have individual rooms and equipment."[32]

More recently Ericson explained that the unit shop is not yet obsolete ". . . for nearly all large junior and senior high schools now use individual shops, each teaching a single subject, and those who are deviating from the practice do so only up to a certain point."[33] Unit shops continue to be defended over the general shop by both teachers and supervisors for several reasons. Those generally given are:

1. Teaching a unit shop can be made more definite and purposeful;
2. The efforts of students can be kept upon one subject long enough for some degree of maturity to be experienced in regard to processes and materials belonging to the subject;
3. Students are not distracted by a variety of work carried on by other members of the same class;
4. Some degree of efficiency in handling tools and material in any one subject is better than superficial smattering or trial-and-error experience in other types of shop or laboratories.

[24] Bedell, Earl L., "Organization of Subject Matter for the General Shop," *Industrial Education Magazine*, 30:251, Jan., 1929.

[25] London, H. H., "Laying Out the One-Teacher Industrial Arts Department," *Industrial Arts and Vocational Education*, 37:83, Mar., 1948.

[26] Selvidge, Robert W., "The General Shop," *Industrial Education Magazine*, 32:213–214, Jan., 1931.

[27] Proffitt, Maris M., *Industrial Education in 1924–26*, United States Bureau of Education Bulletin 1927, No. 29 (Washington: Government Printing Office, 1927), pp. 9–10.

[28] Proffitt, Maris M., *Trends in Industrial Arts*, United States Office of Education Pamphlet 1940, No. 93 (Washington: Government Printing Office, 1940), pp. 12–13.

[29] United States Office of Education, "Offerings and Enrollments in High School Subjects," *Biennial Survey of Education in the United States, 1948–1950* (Washington: Government Printing Office, 1951), pp. 30–41.

[30] Proffitt, Maris M., *Trends in Industrial Arts*, United States Office of Education Pamphlet 1940, No. 93 (Washington: Government Printing Office, 1940), pp. 12–13.

[31] Bedell, Earl, "The General Shop — Its Function and Purpose," *Industrial Education Magazine*, 30:170, Nov., 1928.

[32] Smith, Homer J., "Some Beliefs About Industrial Arts," *Industrial Arts & Vocational Education*, 23:4, Jan., 1934.

[33] Ericson, Emanuel E., *Teaching the Industrial Arts* (Peoria: The Manual Arts Press, 1946), p. 303.

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(Continued from page 74)

used, particularly in vocational shops, must be determined before space or equipment requirements can be considered. Automotive training on live cars has different requirements than on dead engines. One city system built an elaborate carpentry shop; then used only the classroom at school and taught the manipulative phases of the trade on outside construction jobs. Such an unwise expenditure can result only in justifiable criticism. If visual aids are to be used effectively light control must be included in the educational specifications.

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(Concluded on page 82)

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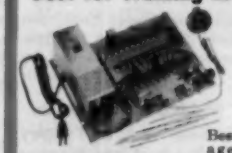

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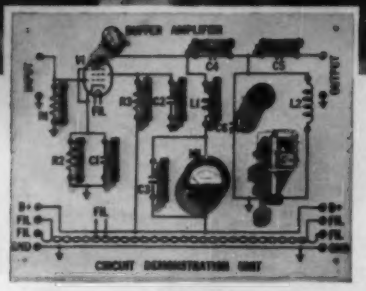

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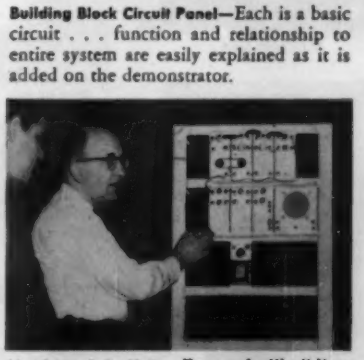

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CONSULTANT'S ROLE

(Concluded from page 80)

needed electric shop in one city is now used as a kindergarten because of failure to develop a definite plan regarding selection and procurement of equipment. Realistically, a formal policy on equipment replacement could become a part of the educational specifications.

Space Requirements

The *determination of space requirements* can develop into either one of the most controversial problems or one of the most neglected problems in building planning unless it is approached in accord with the title italicized above, with the emphasis on the final word. Some texts, many magazine articles, and certain state educational authority manuals set space minimums in terms of square feet per pupil. Such standards are based on the assumption that no educational specifications will be developed. Too, minimum standards have a tendency to become maximums in practice.

Differences in class size, in methods of instruction, in types of jobs or projects to be developed, in size of equipment, and in need for material, supply, and tool storage, all have bearing on the need for more or less space than that indicated by "standards."

It is to be expected that classrooms for a given educational level will be the same size, but designing all the shops the same size almost always indicates complete lack of real educational planning. New building floor plans in educational and architectural periodicals showing several shops the same size are always cause for skepticism.

Service Requirements

Consideration of *mechanical and utility service requirements* is often deferred until late in the planning process. Design problems and the pressure of time can result in omissions and inefficient installations if these needs are not considered early. Horrendous examples are too numerous and well known to require illustration. But inefficient arrangement and lack of flexibility in mechanical and utility services are the most chronic complaints of teachers about their shops.

Cost Determination

The *determination of costs* becomes a part of the educational specifications if real economy rather than either mere cheapness or foolish extravagance is to be achieved. Too often vocational and industrial arts programs are planned and shops designed on the basis of a pre-determined amount of available money. If the needs of the community and students are to be met, the program must be planned first. Then, if it is beyond the financial ability of the district, it should be tailored to what can be done immediately, with provisions for expansion when sufficient funds become available. Conversely, in some schools, as a result of a combination of aggressive leadership and lack of educational planning, too much has been spent simply because the money happened to be available.

The foregoing statements of the basic planning problems, the examples given of poor solutions, and the illustrations of factors that should have been considered, describe real situations. In each case the teachers and administrators were competent, skillful men. Their only inadequacy was lack of planning experience and lack of information regarding necessary educational specification content.

The competent, experienced shop planning consultant can be of the greatest assistance to the local staff and of the greatest value to the local school authorities in three ways. He can provide leadership in the program problem studies; he can provide know-how in the preparation of the educational specifications; and he can draw upon his background of experience in the critical analysis of the educational values of all space and equipment proposals.

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Automation, Cybernetics, and Society

By F. H. George. Cloth, 283 pp., $12. Philosophical Library, New York, N. Y.

This book gives an essential over-all picture of the new subjects of automation and cybernetics and their ramifications. It is not a text intended for specialists in any field for it is primarily aimed to clarify the problem of the place of automation and cybernetics in society not only for the scientists, but for all interested readers.

In three parts — the social background, cybernetics and automation, and operational research and automation — the book discusses such topics as computers and computations, servo-systems, programming a computer to learn, social control and communication, the automatic factory, etc.

Vocational Education for Rural America

Cloth, 354 pp., 6⅛ by 9⅛ in., illus., $4. Department of Rural Education, National Education Association, Washington 6, D. C.

This book describes some basic problems which must be faced — the maldistribution of human, economic, and educational resources.

It is divided into two parts, with chapters dealing with vocational education in the past and present culture; forces affecting vocational education in rural America; vocational education for rural adults; financing vocational education; vocational education in rural community areas; industrial arts — its contributions and opportunities; critical issues in vocational education, and many others.

Organized Occupational Curriculums

By Henry Armsby, Walter Eells and S. V. Martorana. Paper, 201 pp. Office of Education, U. S. Department of Health, Education, and Welfare.

This is the second in a series of annual surveys of enrollments and graduates in undergraduate organized occupational curriculums of at least one, but less than four years in length, at institutions of higher education in the United States.

Exploring the Graphic Arts

By Anthony Marinaccio. Cloth, 297 pp., $4.88 (text edition). D. Van Nostrand Co., Inc., Princeton, N. J.

This second edition has been revised to include latest developments in graphic arts materials and methods. Throughout the book new drawings and photographs have been added.

Following an historical sketch on the origins of the printed work, the author presents descriptions of modern methods of type setting and printing processes. Sample type faces are reproduced, and suggestions are given for effective type choices and layout. Letterpress printing is covered, and in this second edition the newest methods of screen process printing are examined in close detail. There are also chapters on paper manufacture, bookbinding and printing ink manufacture.

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cedures and to illustrate these techniques, there are drawings showing step-by-step sequences. Modern mechanical processes based on the simpler hand techniques are shown in photographs, together with samples of printing.

Industrial Arts Drafting

By John R. Walker and Edward J. Plevyak. Cloth, 208 pp., 8⅝ by 11⅛ in., illus., $3. The Goodheart-Willcox Co., Inc., Chicago 5, Ill.

Industrial Arts Drafting is intended to meet the needs of either junior or senior high school students. The instructional material is presented in such a way that it can be used as a text for a six, nine, eighteen, or thirty-six weeks' course.

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Know Your Woods

By Albert Constantine, Jr. Cloth, 384 pp., 5¾ by 8¾ in., illus., $5.75. Home Craftsman Publishing Co., New York 13, N. Y.

This book is a guide on woods and the trees that produce them. It tells how to identify all the principal trees and all cabinet woods by grain, color, texture, pores; and special tests of smell, touch and even burning to examine the ash. Over 1400 wood names are indexed. There are 256 instructive drawings and nearly 100 special photos of wood grains.

How to Build It

Edited by Larry Eisinger. Cloth, 144 pp., $2.50. Arco Publishing Co., Inc., New York 17, N. Y.

This is the latest in the Arco "how-to-series" for the home craftsman. There are 35 do-it-yourself projects featured, some of which might be suitable for advanced students.

Among the major home improvements are a model kitchen, building a fireplace, constructing a picture window, adding a foyer, etc. The furniture designs feature a bedroom storage wall, several tables, bookcases and cabinets. One of the highlights is a modern playroom bar, complete with TV set and Hi-Fi system, which retracts into a wall and remains hidden behind a flush panel. Tool racks, storage cabinets and a work bench are included among the workshop projects; outdoor designs consist of a log cabin, a sled, and fences.

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Electric Motors and Generators

Cloth, 384 pp., $12. Philosophical Library, New York, N. Y.

The purpose of this book, a collection of chapters by various authors, is to provide an understanding of generators and motors for those outside of electrical engineering, as well as a useful survey for those professionally interested. Avoiding difficult electrical theory and mathematics as far as possible, it describes all types of d.c. and a.c. motors and generators; their design, construction, installation, operation, testing, and maintenance. While the emphasis throughout is on the practical, there is an appendix explaining the fundamentals of electrical theory for the benefit of those whose knowledge of the subject is slight or needs brushing up.

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Magnetism and Electromagnetism

Edited by A. Schure, Ph.D. Cat. No. 166-20, 80 pp., 5½ by 8½ in., $1.80. John F. Rider Publisher, Inc., New York, N. Y.

This book is Volume 20 in the Electronic Technology Series. It deals with the *elementary* aspects of magnetism and electromagnetism to specific related phases of electrical and electronic technology. Magnetism and electromagnetism are two fundamental phenomena that underlie a great many devices which are used in communication equipment as well as industrial electronic equipment. Review problems are included at the end of each chapter.

Advanced Magnetism and Electromagnetism

Edited by A. Schure, Ph.D. Cat. No. 166-26, 112 pp., $2.25. John F. Rider Publisher, Inc., New York, N. Y.

This volume is No. 26 in the Electronic Technology Series. It is devoted to the explanation of the advanced concepts of magnetism and electromagnetism, hence is the companion volume to Catalog No. 166-20.

It penetrates deeply into the theories underlying magnetic and electromagnetic phenomena. It concerns itself with the details of the force acting on a charge moving through a magnetic field, induction lines, magnetic flux, and motion of charge particles in a magnetic field. It examines the different laws which underlie the actions, such as Biot's Law, Faraday's Law, Lenz's Law, and the Curie-Weiss Law.

In all respects it introduces the reader to the most modern concepts in a very lucid and understandable manner. Also covered are such items as the cyclotron, the mass spectrograph and terrestrial magnetism. Review problems are given at the end of each chapter.

Transistors in Radio, Television, and Electronics

By Milton S. Kiver, 424 pp., $5.70, McGraw-Hill Book Company, Inc., New York 36, N. Y.

The second edition of a text for the radio-television and electronic technician who needs a working knowledge of transistors and transistor circuits. The book begins with modern electron theory and then progresses step by step to the operation of every type of transistor in use today. This is followed by a discussion of transistor circuits as they appear in radio receivers, TV sets, and electronic circuitry, such as electronic computers. A set of questions accompanies each chapter.

Television Servicing Course

By M. N. Beitman. Paper, 192 pp., 8¼ by 10¾ in., illus., $3. Supreme Publications, Highland Park, Ill.

The course-lessons in this manual have been prepared for use by electronic and radio technicians who want to understand practical TV repair.

It teaches how to make very simple TV repairs in the first chapters and proceeds to more difficult ones. List of lessons includes: Simple Adjustments to Correct

(Continued on page 88)

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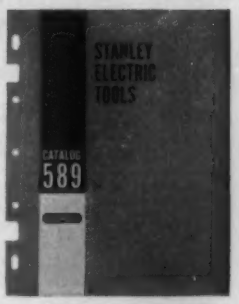

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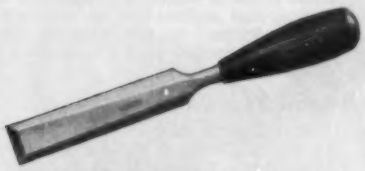

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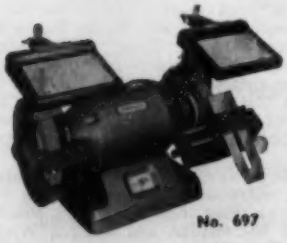

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Fundamentals of Electricity

By Kennard C. Graham. Cloth, 342 pp., 5¾ by 8½ in., illus. American Technical Society, Chicago, Ill. (4th ed.).

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The Automobile Electrical System

By Randolph R. Barr and Thomas D. Flocco. Cloth, 418 pp., 6¼ by 9¼ in., illus., $7.95. Chilton Co., Philadelphia 39, Pa.

This book presents the basic electrical principles fundamental to all the electrical devices found in the automobile. There are chapters dealing with typical electrical circuits, the storage battery, headlights and lighting system, ignition system, electrical accessories, generator fundamentals and service, regulator, and starting motors.

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Automotive Mechanics Series

By William H. Crouse. McGraw-Hill Book Co., Inc., New York 36, N. Y.

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Know Your Car

By Willard A. Allen. Cloth, 154 pp., 6⅛ by 9¼ in., illus., $3.50. American Technical Society, Chicago 37, Ill.

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Foundry Engineering

By H. F. Taylor, M. C .Flemings, and J. Wulff. Cloth, 407 pp., $8.25. John Wiley & Sons, New York 16, N. Y.

This book deals with the ancient art of metal casting, born in the Bronze Age, and passed down through the centuries in a traditional aura of secrecy.

The authors emphasize fundamental concepts that apply to all cast metals. They present a modern approach to engineering principles and methods of foundry operation.

The book offers up-to-date coverage of such topics as: Refractories, Casting Processes, Melting Equipment and Practices, Sand Reclamation and Control, Welding, and Heat Treatment.

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Projects in Engineering Metalwork

By P. F. Collins and R. Parker. Cloth, 72 pp., $2.95. Charles T. Branford Co., Newton Centre 59, Mass.

A collection of fresh metalwork projects by two English industrial educators.

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(Continued on page 90)

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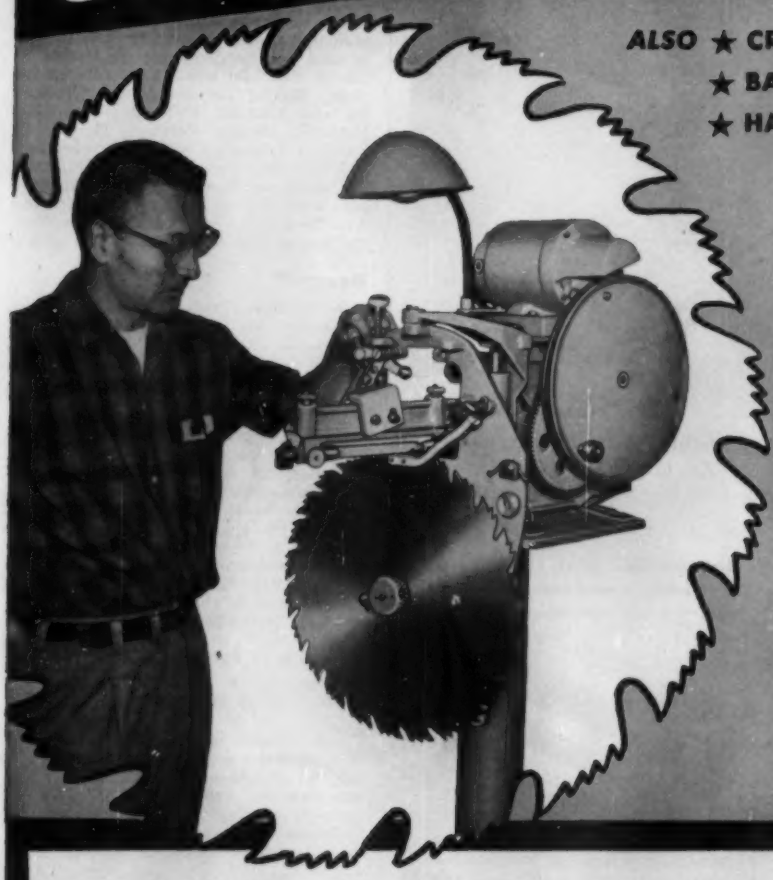

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The Foley Saw Filer is doubly valuable in manual training departments—it keeps all your saws in perfect cutting condition at low cost and greatly prolongs their life; it also is a great asset for training students in the correct care and maintenance of both hand and power saws. With the Foley Saw Filer, the Foley Retoother (for hand saws) and Foley Power Setter, (last two not shown) you can sharpen *4 to 6 hand saws per hour.*

The exclusive Foley principle of jointing the saw as it is filed, keeps all teeth uniform in size, shape and spacing; it also keeps circular saws perfectly round. This assures a fast, smooth, true cutting saw that stays sharp longer, runs cooler, and frequently doubles the life of the saw.

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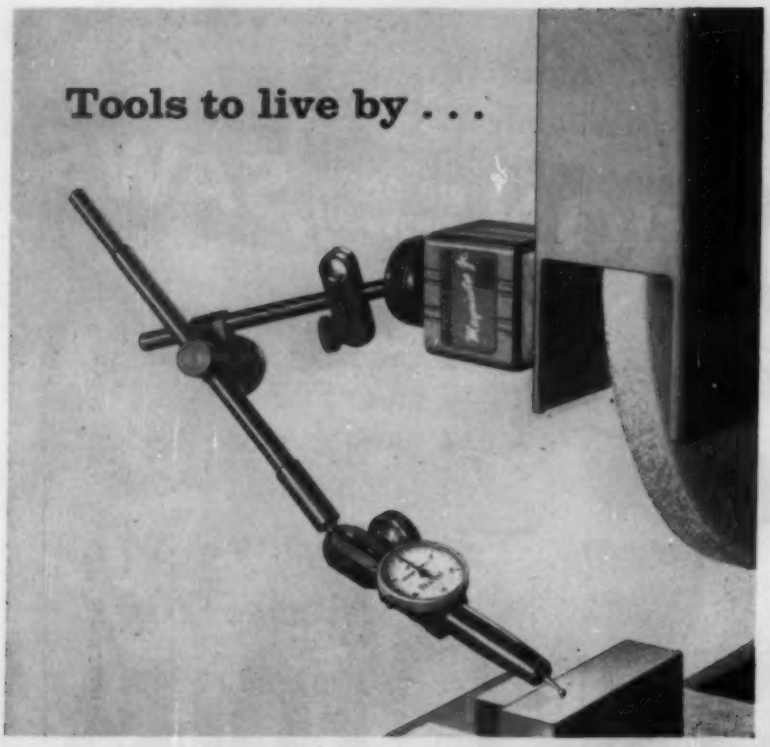

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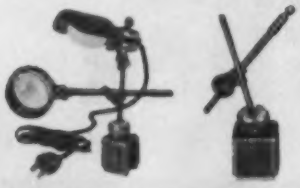

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Versatile and compact . . . ideal for use with Magnicator Jr.

The BesTesT Dial Indicator fits almost any holding tool, and is particularly useful with Magnicator Jr. (photo above). Being only 2.6" long, it works in tight spots. Lever reverses position of contact point . . . swivel clamp attaches in several positions. Range: .030" by .0005". Furnished in wooden case with rod, bars, 3 different contact points.

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NEW BOOKS

(Continued from page 88)

finished article, and each individual part is shown fully dimensioned.

Brief outlines of procedure for each project have been included opposite each drawing. Chapters include garden tools, box corners, hand hoe, shelf, door bolt, fire shovel, screw driver, ash tray, boiler, toasting fork, various drawer pulls, etc.

Ceramics

By Vincent A. Roy. Cloth, 278 pp., 7¼ by 10⅛ in., illus. McGraw-Hill Book Co., Inc., New York, N. Y.

This book was written primarily for the beginning student of pottery. Also, it can be used as a handbook for the teacher of fine or industrial arts. Topics covered include: Making Ceramic Articles; Designing and Planning Ceramics; Decorating Methods; Glazing Pottery; The Firing Process; Enameling on Metal; Projects and Activities; Ceramics in Everyday Life.

Photographs show actual industrial processes employed by manufacturers of pottery. Illustrations in the color section show the ancient and modern uses of ceramics.

Gemcraft

By Lelande Quick and Hugh Leiper. Cloth, 181 pp., $7.50. Chilton Co., Philadelphia 39, Pa.

Beginning with a description of the properties and physical characteristics of gems, including synthetics and imitations, the authors discuss the equipment needed and how to saw, grind, lap, sand, and polish. They cover the grinding and polishing of faceted stones, with a special helpful section on dopping, carving and sculpturing gemstones, mosaic and intarsia, plus special polishing problems of gemstones.

Gemstone novelties are also included, such as bookends, clocks, lamps, ashtrays, agate-handled silverware, dishes, and many others. There is also a chapter on where and how to collect gemstones.

Elements of Reinforced Concrete

By Sylvan P. Stern. Cloth, 444 pp., $10.60. Prentice-Hall, Inc., New York 11, N. Y.

This technical book is intended to introduce engineering students into the methods of designing and making concrete structures for building jobs. The text is complete especially from the mathematical standpoint and represents long experience in successfully teaching the subject.

Demonstrations in Science

By A. P. Barruss. Paper, 32 pp. Texaco Research Center, Beacon, N. Y.

The purpose of this booklet is to help guide young people who are interested in the sciences into scientific careers.

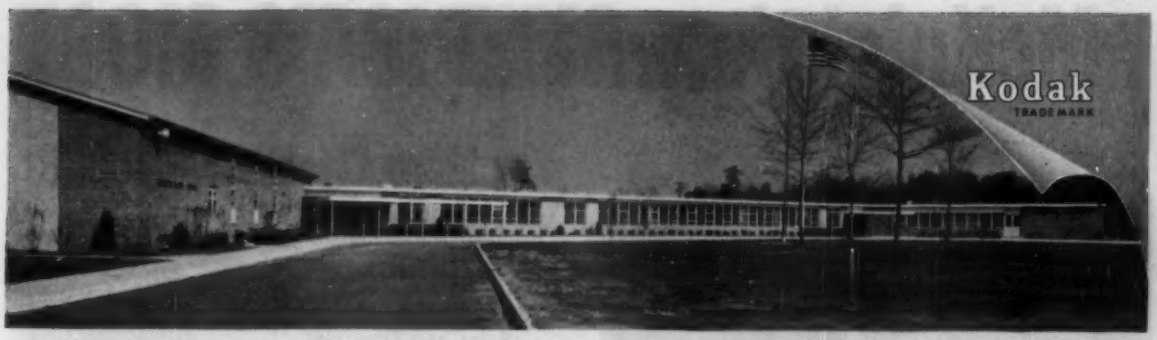
For each of the 14 demonstrations cited, the objective, apparatus and procedure are given. Demonstrations include: Bernoulli's Theorem; Paper Chromatography; Cryophorus; Low Temperature Demonstrations; Stroboscope; Combustion Phenomena; Fluidized Solids; Dilatancy; Ultra-Violet Phenomena; and Foamed Plastic.

From Magic to Science

By Charles Singer. Paper, 253 pp., 5¼ by 8 in., illus., $2. Dover Publications, New York 14, N. Y.

In this illustrated book, the author describes the lore of the Middle Ages and

(Continued on page 94)



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#102 by O. A. Ludwig

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NEW BOOKS

(Continued from page 90)

tells how European science was reawakened through contact with Arab and Jewish scholarship.

Chapters include: Science Under the Roman Empire; The Dark Ages and the Dawn of Science; Early English Magic and Medicine; Early Herbals; The Visions of Hildegard of Bingen; and, The School of Salerno and its Legends.

Preparation of Mentally Retarded Youth for Gainful Employment

Paper, 86 pp. U. S. Department of Health, Education, and Welfare.

This is a report of a study carried on by the U. S. Office of Education, U. S. Office of Vocational Rehabilitation, and the Project on Technical Planning of the American Association on Mental Deficiency. The study was confined to aspects dealing with preparation of the mentally retarded for gainful employment.

The three agencies called a conference of national leaders in the field to discuss the problems and to work toward recommendations. The first half of the booklet gives a report of that conference. The second half cites programs now in effect in different cities for the preparation of mentally retarded youth for employment.

Management Training for Small Businesses

Paper, 51 pp. Office of Education, U. S. Department of Health, Education, and Welfare.

This bulletin contains suggestions that should aid in organizing courses in administrative management for proprietors and managers of small distributive business. It outlines suggested course content that provides the small business man an opportunity to review his operation in connection with men, money, markets, and management practices, and their interrelationship. Suggested procedures which have been used in organizing courses, enlisting community support, securing teachers and instructional materials, and providing a comprehensive and balanced management training program are outlined in the bulletin.

High School Civil Service Course

By Max M. Gitlin. Paper, 180 pp., 7⅞ x 10¼ in. Arco Publishing Co., Inc., New York 17, N. Y.

This course was developed with the co-operation of the Bureau of Curriculum and Research of the Board of Education of the City of New York and the Department of Personnel of the City of New York.

It offers a study area to help interest the great percentage of non-college preparatory students. There are six units of work in all — one in mathematics, two of English, one unit of hygiene, one unit of history, and one summary Civil Service unit. Each Civil Service lesson is in the form of a worksheet of two pages.

Diamond Dust

By Thomas Diamond. Paper, 106 pp., 5⅜ x 8½ in., $2. Prakken Publications, Ann Arbor, Mich.

This book is a collection of 77 Diamond Dust columns that have appeared in *School Shop* during the past 10 years. It covers all phases of shop teaching in school today.

The author uses a light, informal approach in presenting shop-teaching foibles, yet each column contains a practical point.

The columns are divided into 10 classifications: Some Gentle Heresies; Getting the Lesson Across; Running the Shop; Diamond's Laws of Learning; The Ubiquitous Project; The Bosses; Teaching Teachers; Shop Teachers and Their Brother Men; Teachers As People; and, Pot Pourri.

Contemporary and Traditional Furniture

By Verne Weeks, Cloth, 80 pp., 8½ by 11¼ in., illus., $3.50. The Bruce Publishing Company, 400 North Broadway, Milwaukee, Wis.

This book consists of 32 designs for useful and attractive pieces of furniture. Among the furniture pieces are several kinds of tables, beds, an upholstered chair, book ends, benches, chests of drawers, a book case, storage and gun cabinets, wall shelves and stools.

With both the home craftsman and the woodworking student in mind, the author has included projects on varying levels of skill. Mechanical drawings, bills of materials, photographs of finished pieces and written instructions accompany the projects.

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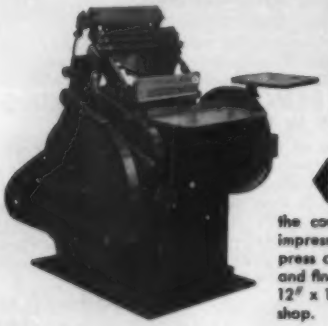

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Vince Kulage, POST sales representative (left) chats with Rudy Steffan about the need for good readable prints. Mr. Steffan, President of Service Blue Print and Photo Copy Co. in St. Louis, is a long time user of POST products.

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association / news

ILLINOIS STATE INDUSTRIAL EDUCATION EXHIBIT

The Illinois State Normal University will serve as host to the first Annual State Industrial Education Exhibit to be held on May 13 and 14, 1960. Participants will be industrial education students throughout the State of Illinois who have received either a first, second, or third place award in one of the five regional exhibits held during the month of April.

The following level, division, and classification breakdown will be used in both the regional and state exhibits:

Level I — Students in grades 7 and 8 (7 divisions, 26 classifications)

Level II — Students in grades 9, 10, 11, or 12 who have completed the project in the first year of work in a given division (7 divisions, 26 classifications)

Level III — Advanced students in grades 10, 11, or 12 who have completed the project after having had more than one year (2 semesters) in a given division (7 divisions, 26 classifications)

Level IV — Any student in a vocational-industrial education class (7 divisions, 14 classifications).

Demonstrations, exhibits and tours will be conducted during the period of time that the projects are being judged.

Frank E. Sharkey, Chairman, Industrial Education Exhibit, Illinois State Normal University, Normal, Ill.

CALIFORNIA INDUSTRIAL EDUCATION ASSOCIATION

"Scramble Sessions," featuring prominent industrial education teachers from the Los Angeles City School District, will be one of the features of the California Industrial Education Association Convention to be held at the Biltmore Hotel in Los Angeles on March 11 and 12, 1960.

Under the leadership of Jack Brown and James C. Raddatz, the scramble sessions will feature nine demonstrations taking place simultaneously in separate rooms. Each demonstration will last ten minutes, and at the ringing of a bell the audience of each will move to the next demonstration. These sessions will demonstrate dozens of new ideas in teaching techniques. Mimeographed information sheets, procedure sheets, and plans will be available at the demonstrations so that teachers may review and put into practice ideas which they feel will be of value to their teaching program.

Some of the activities planned for the two-day convention are tours of the Los Angeles State College, the Manual Arts High School, and Henry Clay Junior High School; commercial exhibits; displays of outstanding industrial education projects; and a section featuring teaching technique presentations.

The annual banquet will be held in the Los Angeles State College.

AMERICAN WELDING SOCIETY

The American Welding Society will hold its 41st Annual Convention and Welding Exposition, April 25 to 29, 1960, in Los Angeles, Calif.

Technical meetings will be held in the Biltmore Hotel on April 25 to 29, and the welding show in the Great Western Exhibit Center, April 26 to 28.

For further details write Information Center, American Welding Society, 33 West 39th St., New York 18, N. Y.

NATIONAL ELECTRONICS CONFERENCE

New officer elected for 1960 are:

Dr. Lawrence W. Von Tersch, head of the electrical engineering department at Michigan State University, president; Joseph J. Gershon, DeVry Technical Institute, executive vice-president; James H. Kogen, GPE Controls, Inc., secretary; Dr. Harold E. Ellithorn, University of Notre Dame, treasurer; Robert J. Parent, University of Wisconsin, assistant treasurer; and William O. Swinyard, vice-president of Hazeltine Research, Inc., NEC chairman of the board.

The next National Electronics Conference will be held in Chicago at the Hotel Sherman October 10, 11, and 12.

The National Electronics Conference, Inc., is a non profit organization serving as a national forum for the presentation of authoritative technical papers on electronic research, development and application.

CONNECTICUT I.A. TEACHERS MEET

The annual dinner meeting of the Eastern Connecticut Industrial Arts Association was held on Thursday, December 3, 1959, at Coventry Grammar School, Coventry, Conn.

The guest speaker was Professor Pierre Kleykamp, chairman of the Division of

(Continued on page 98)

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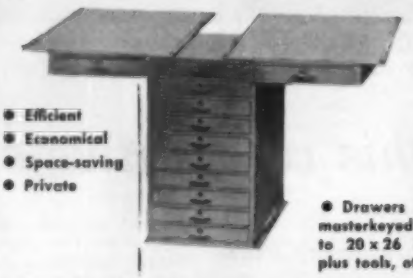

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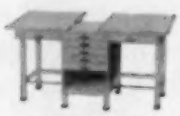
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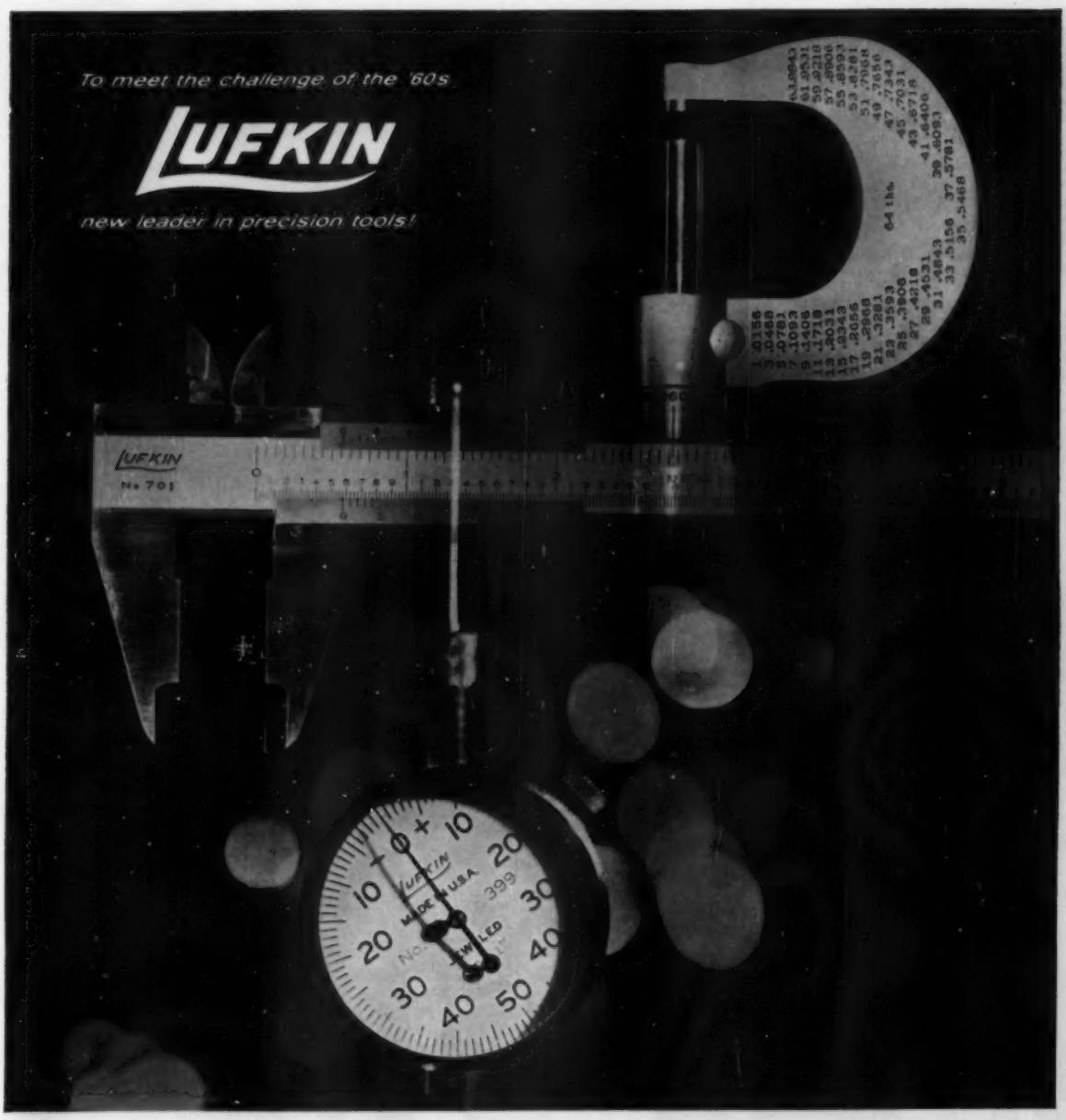

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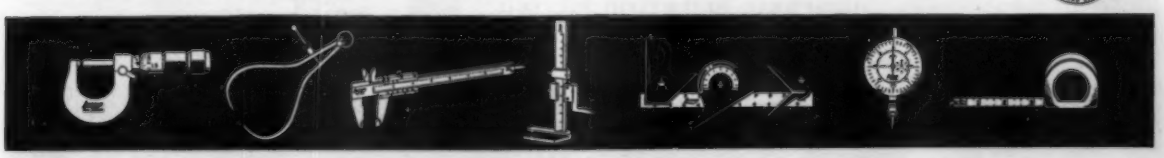

(For more information from advertisers, use the postcard on page 155)

association / news

ILLINOIS STATE INDUSTRIAL EDUCATION EXHIBIT

The Illinois State Normal University will serve as host to the first Annual State Industrial Education Exhibit to be held on May 13 and 14, 1960. Participants will be industrial education students throughout the State of Illinois who have received either a first, second, or third place award in one of the five regional exhibits held during the month of April.

The following level, division, and classification breakdown will be used in both the regional and state exhibits:

Level I — Students in grades 7 and 8 (7 divisions, 26 classifications)

Level II — Students in grades 9, 10, 11, or 12 who have completed the project in the first year of work in a given division (7 divisions, 26 classifications)

Level III — Advanced students in grades 10, 11, or 12 who have completed the project after having had more than one year (2 semesters) in a given division (7 divisions, 26 classifications)

Level IV — Any student in a vocational-industrial education class (7 divisions, 14 classifications).

Demonstrations, exhibits and tours will be conducted during the period of time that the projects are being judged.

Frank E. Sharkey, Chairman, Industrial Education Exhibit, Illinois State Normal University, Normal, Ill.

CALIFORNIA INDUSTRIAL EDUCATION ASSOCIATION

"Scramble Sessions," featuring prominent industrial education teachers from the Los Angeles City School District, will be one of the features of the California Industrial Education Association Convention to be held at the Biltmore Hotel in Los Angeles on March 11 and 12, 1960.

Under the leadership of Jack Brown and James C. Raddatz, the scramble sessions will feature nine demonstrations taking place simultaneously in separate rooms. Each demonstration will last ten minutes, and at the ringing of a bell the audience of each will move to the next demonstration. These sessions will demonstrate dozens of new ideas in teaching techniques. Mimeographed information sheets, procedure sheets, and plans will be available at the demonstrations so that teachers may review and put into practice ideas which they feel will be of value to their teaching program.

Some of the activities planned for the two-day convention are tours of the Los Angeles State College, the Manual Arts High School, and Henry Clay Junior High School; commercial exhibits; displays of outstanding industrial education projects; and a section featuring teaching technique presentations.

The annual banquet will be held in the Los Angeles State College.

AMERICAN WELDING SOCIETY

The American Welding Society will hold its 41st Annual Convention and Welding Exposition, April 25 to 29, 1960, in Los Angeles, Calif.

Technical meetings will be held in the Biltmore Hotel on April 25 to 29, and the welding show in the Great Western Exhibit Center, April 26 to 28.

For further details write Information Center, American Welding Society, 33 West 39th St., New York 18, N. Y.

NATIONAL ELECTRONICS CONFERENCE

New officer elected for 1960 are:

Dr. Lawrence W. Von Tersch, head of the electrical engineering department at Michigan State University, president; Joseph J. Gershon, DeVry Technical Institute, executive vice-president; James H. Kogen, GPE Controls, Inc., secretary; Dr. Harold E. Ellithorn, University of Notre Dame, treasurer; Robert J. Parent, University of Wisconsin, assistant treasurer; and William O. Swinyard, vice-president of Hazeltine Research, Inc., NEC chairman of the board.

The next National Electronics Conference will be held in Chicago at the Hotel Sherman October 10, 11, and 12.

The National Electronics Conference, Inc., is a non profit organization serving as a national forum for the presentation of authoritative technical papers on electronic research, development and application.

CONNECTICUT I.A. TEACHERS MEET

The annual dinner meeting of the Eastern Connecticut Industrial Arts Association was held on Thursday, December 3, 1959, at Coventry Grammar School, Coventry, Conn.

The guest speaker was Professor Pierre Kleykamp, chairman of the Division of

(Continued on page 98)

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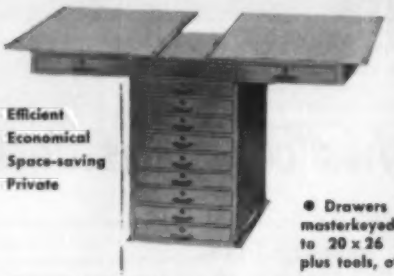

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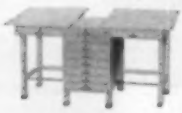
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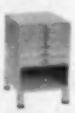
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Dual boards and drawer space for 12 the DU-1200

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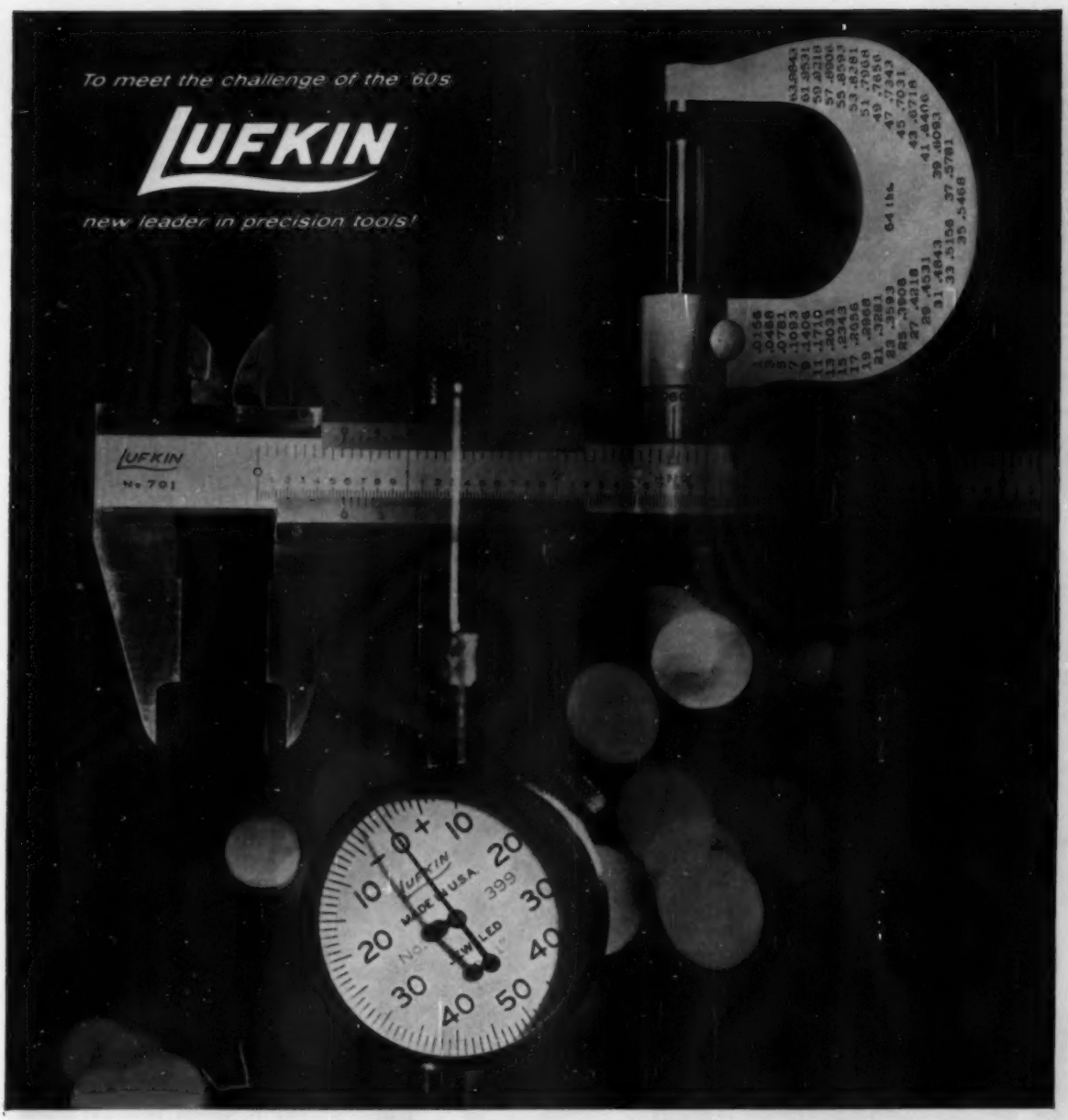

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Your industrial distributor knows precision tools and can show you how Lufkin leads in design and craftsmanship. And his stock is maintained to fit your needs. Lufkin, Saginaw, Mich.

ASSOCIATION NEWS

(Continued from page 96)

Industrial Production, Rhode Island School of Design, Providence, R. I.

A tour of the building and shops, and a slide illustrated talk on "Design, Design Problems and Industrial Arts," preceded the dinner.

Following the dinner there was a resume discussion and critique of sample projects. Many art teachers were present as guests of their fellow industrial arts teachers.

The directors of all Regional Technical Schools in Eastern Connecticut were invited.

Among the guests were John Karnes, professor of industrial education, University of Connecticut, and G. Wesley Ketcham, state supervisor of industrial arts in Connecticut. — *Normand Methot, Secretary, New London, Conn.*

EDUCATION COUNCIL OF THE GRAPHIC ARTS INDUSTRY

The Second Annual Awards Banquet of the Education Council of the Graphic Arts Industry was held December 5, 1959, at the Hotel Mayflower Ballroom, Washington, D. C.

Dr. Frank W. Hubbard, assistant executive secretary of the National Education Association of the United States, was the principal speaker. He reminisced about the printing courses he took while in junior high school and of the inspiration and fine education provided him by his printing teacher.

The group was welcomed by Mr. L. C. Shomo (National Publishing Company, Washington, D. C.), past-president of the Education Council.

In impressive ceremonies, a group of printers were honored for their service in the field of graphic arts education.

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FIFTH ANNUAL I.E. INSTITUTE

The California Industrial Education Association, San Francisco-Oakland Bay Section, presented its fifth annual Industrial Education Institute on Saturday morning, January 23, 1960, at the new San Francisco State College Industrial Arts Building.

Dr. Dwight W. Nichols and his staff acted as hosts.

Don Guidoux, president-elect of the Bay Section, was chairman. Each of the ten Bay Section chapters presented new techniques and demonstrations within an industrial education area at three different times during the institute.

The theme for the institute: "Looking Ahead with New Ideas and Techniques in Industrial Education."

The guest speaker, Dr. Thomas Wood, assistant superintendent of the Washington Union High School District, Centerville, Calif., spoke on "An Administrator Looks at Industrial Education." — *Dr. Glenn I. Newhouse, Supervisor of Industrial Arts, Oakland Public Schools.*

L.A. COUNTY INDUSTRIAL EDUCATION ASSOCIATION

The Los Angeles County Industrial Education Association held its latest meeting on December 11, at the William S. Hart High School in Newhall. This meeting was one of four held each year by the association. Mr. Ron Brown is president.

Over 300 educators took part in the meeting which was featured by the annual "Do-It-Yourself" program. This program has become extremely popular with Industrial Education teachers. It is at this meeting, unique among educational meetings, that every person in attendance actually constructs a project that he can take home with him. One of the educational techniques learned through this kind of program is that of production.

The Los Angeles County Industrial Education Association is an organization of industrial educators in the county. The organization is a recognized chartered local of the California Industrial Education Association and an affiliate of the California Teachers Association. Among the purposes of this organization is the recruitment of quality candidates for the teaching profession.

Numerous administrators were present also to take advantage of this program.

COMING CONVENTIONS

Mar. 11–12. California Industrial Education Association, at Biltmore Hotel, Los Angeles, Calif. President, Dr. Clifford Dobson, 4600 W. Olympic Blvd., Los Angeles 19, Calif.

Mar. 17–19. New Jersey Vocational Arts Association, at Hotel Berkeley-Carteret, Asbury Park, N. J. Secretary, Richard Harthmann, 236 Lexington Ave., Jersey City 4, N. J.

Mar. 31–Apr. 2. Ohio Industrial Arts Association, at Neil House, Columbus, Ohio. Pirate, Robert S. Deafenbaugh, 780 Patton St., Newark, Ohio.

Apr. 19–22. American Industrial Arts Association, at Royal York Hotel, Toronto, Ont., Can. Pirate, George H. Ditlow, 1730 Colonial Manor Drive, Lancaster, Pa.

Apr. 21–23. New York State Vocational & Practical Arts Association, at Linton High School, Schenectady, N. Y. President, Reno S. Knouse, exhibit chairman, Charles W. Clark, 1435 Baker Ave., Schenectady, N. Y.

Apr. 21–23. Michigan Industrial Education Society, Inc., at Lansing, Mich. John H. Koenig, 4628 Flajole Rd., Midland, Mich.

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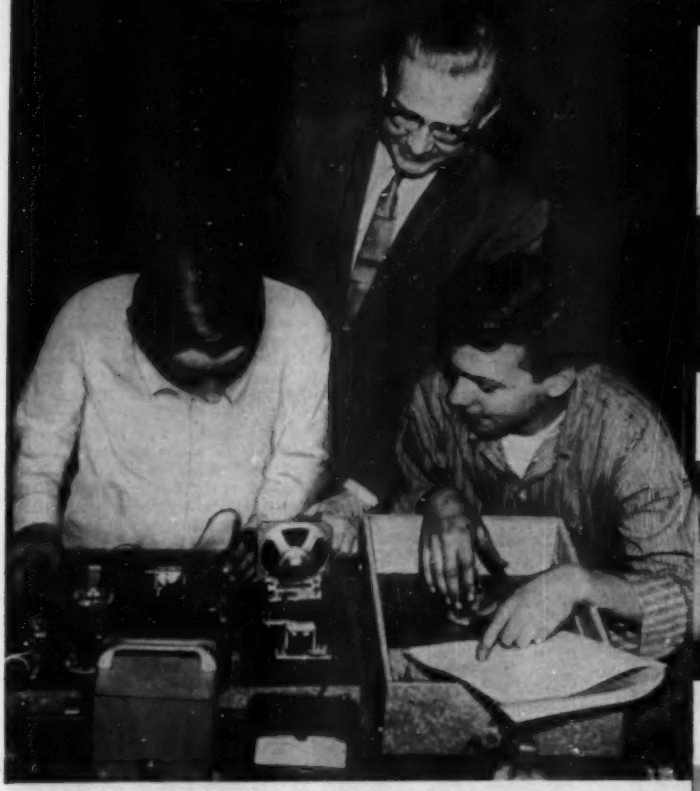

Mr. Stanley Gardner, electronics instructor at Newton Technical High School, Newton, Mass., whose statement appears above, is shown observing two students who are constructing a circuit from an EIA Manual.

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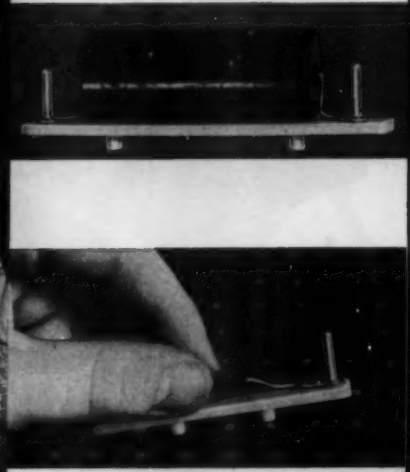

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BULLETIN BOARD

(Continued from page 14)

E. Vredevoe, professor of education at the University of California, Los Angeles.

Dr. Vredevoe presented his findings at the annual meeting of the American Association for the Advancement of Science. His group visited 87 4schools, both public and private, during the last 11 years. More than 1000 teachers and administrators were interviewed and 400 students were questioned.

It was found that the methods used to discipline students ranged from punishment with a whip or rubber hose to complete disregard of misbehavior. Professor Vredevoe deplored either extreme. The most effective punishment, he found, was segregation of an offender from his friends and other students. It was found that bodily punishment was ineffective in improving school discipline.

"No general procedure fits all cases," Dr. Vredevoe said, "but this study indicates that corporal punishment is not the answer. Segregation from others where possible seems to be the most effective in serious cases. It at least prevents the loss of time or services by the 95 per cent who are more deserving of our consideration."

I-A PROGRAM AIMS IN LEYDEN

In Leyden Community High Schools, Franklin Park, Illinois, the recently redefined industrial arts program is organized to provide students with a working knowledge of present-day technology and some experiences working with the material of industry.

The program aims to contribute to the student's education by (1) increasing his effectiveness as a consumer of industrial products; (2) providing experiences which may serve as guides in selecting an occupation; and (3) fostering the many avocational pursuits that are a natural outgrowth of industrial arts experiences.

Exploratory shop areas in freshmen industrial arts include ceramics, handicrafts, mechanical drawing, metals, electricity, and woodworking.

Objectives are: to acquaint the student with the history and development of a particular industry; to teach an understanding of some of the basic principles of a particular industry; to give the student an opportunity to try some of the methods used in a particular industry on various materials; to give the student information and start him on the way in learning skills that will be of use to him for present and future leisure-time activities; to stimulate self-expression and craftsmanship; to develop in the student safety consciousness in the use of the tools of industry and to further develop safe habits in working in the shop; to make the student a wiser consumer of the materials and products of industry; to provide the student with experiences in various industrial areas so that he may make a more intelligent choice of future high school courses and possibly his future occupation.

Beginning and advanced courses cover the special areas of mechanical drawing, architectural drawing, electronics, welding, ceramics, handicrafts, electricity, woodworking, metals, and machine shop.

Objectives of these courses are: to acquaint students with a particular industry; to develop the basic skills of a particular industry; to increase interest in a special area of industry; to increase consumer knowledge; to assist in the discovery of aptitudes; and to teach the basic principles of an industry.

PART-TIME JOBS CURB DELINQUENCY

Part-time employment combined with schoolwork is proving successful for keeping hundreds of high school boys in school and out of trouble, according to Paul Driscoll, social studies chairman assigned to the high school division office in the New York city schools.

The project was begun in the fall of 1955, when two work-study courses were organized on an experimental basis in a junior and senior high school.

The program in each school was limited to 20 boys of 15 or over. A teacher-coordinator was assigned to each school to serve as guidance counselor, placement officer, and supervisor of the group both in school and on the job.

Under the program, the boys attended school in the morning. Their curriculum was flexible, with emphasis on individual instruction. In the afternoon they worked at jobs provided for them through the school. School credit, equivalent to that of a major subject, was given for "satisfactory job performance."

GEORGIA SOUTHERN COLLEGE

The name of the state college at Statesboro, Georgia, in Collegeboro has been changed from Georgia Teachers College to Georgia Southern College by the state's Board of Regents, effective December 9, 1959.

The name change was requested by school officials to more accurately reflect the educational scope of the institution. The school offers the Bachelor of Arts and Bachelor of Science degrees in a wide field of majors. Major emphasis will continue to be on teacher education.

The Industrial Education Department provides an undergraduate and graduate degree program in industrial arts and a two-year industrial technology program.

WORKSHOPS IN AUTOMOTIVE TECHNOLOGY

For the second straight year, State University Teachers College, Oswego, N. Y., General Motors, and the New York State Education Department are co-operating to offer an advanced automotive technology course at two widely separated off-campus training centers, one in Tarrytown and one in Clarence.

Designed to serve the industrial arts and vocational education teacher who regularly employs automotive technology in the public schools, the workshops were made possible by the generosity of General Motors, which makes available the facilities of its own training centers at which GM service managers study and are upgraded.

The workshop is run in co-operation with the Bureau of Vocational Curriculum Construction and Industrial Teacher Training of the State Education Department, under the direction of Dr. C. Thomas Olivo. State Education Department coordinator Frank Howard is in charge of the Tarrytown center, and heading the Clarence center is Dr. Walter Zimmerman of the Buffalo Industrial Teacher Training Office.

Those taking part in the workshop can select two of four areas in which to specialize — electricity, carburetion, automatic transmission, or body work.

PRINTING FILM

An instructional film which will fill a national education need in the field of printing has recently been completed by the co-operative efforts of the graphic arts

(For more information from advertisers, use the postcard on page 155)

department and the audio-visual center of Stout State College at Menomonie, Wis.

Entitled "Printing: Platen Press Makeready," the new 16mm., sound motion picture runs 15 minutes in black and white.

Not only does the new motion picture provide an efficient means of describing the process of making ready a platen press and a type form, but the makeready process described is one which, over the years, has been perfected in the graphic arts department of Stout and which is highly regarded in printing and printing-education circles.

INDUSTRIAL ENGINEERING COURSE AT WMU

A new program in industrial engineering is being offered at Western Michigan University, Kalamazoo, since the fall of 1959, it was announced by President Paul V. Sangren, following approval by the State Board of Education. The program was established with the present staff and physical facilities.

surveying the ----------school scene

▸ The Democratic bill for federal aid to education, providing in two years a total of $1,833,000,000 was passed by the Senate by a vote of 51 to 34. At writing, the measure faces a "dim future" in the House of Representatives.

▸ Under NDEA provisions, the U. S. Office of Education has already made $79.4 million available to elementary and secondary schools in 52 states and territories to improve the teaching of science, mathematics, and modern foreign languages. Commissioner Derthick stated that approximately $91.6 million of the $102 million Congress appropriated for the program for 1959 and 1960 will be used before the close of the 1960 fiscal year on June 30. (Unused 1960 funds can be carried over for use in 1961.)

▸ Discussing taxation in New York, Governor Rockefeller suggested that school boards should be permitted to levy non-property taxes, stating that either real estate will be loaded with a very much higher cost at the local level or the state is going to have to pick up an increasing percentage of the cost of education. He declared that the responsibility for spending local school money and the power to raise it by taxes should go hand in hand.

▸ More and more schools are basing teachers' salaries on quality of service, according to a recent report by the NEA research department: (1) one in six urban school districts provides for a reward or a penalty to recognize quality of service in the salary schedule; (2) the per cent of large urban districts providing superior-service maximums, after decreasing for 14 years, is now increasing.

▸ The Atlanta, Ga., board of education has adopted a revised pupil placement plan to bring it within the requirements of a federal judge who ordered the city's school desegregated. Under present Georgia state laws, integration is forbidden and schools in Atlanta could be closed.

▸ Tomorrow's children will attend windowless schools which are air conditioned in the summer and warmed by their own body heat in the winter by the use of "heat pumps" which pick up and reuse body heat and schoolroom lighting heat, according to schoolhouse architect, Ronald S. Senseman.

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personal / news

Deaths . . .

Dr. Gilbert Sommers Perez, American educator who spent fifty years building up vocational training in Philippine public schools, died on November 22, 1959, of a brain hemorrhage. He was 74 years old.

He was a native of Pensacola, Fla., and received a bachelor of science degree from Bucknell University in 1907, and also studied at the University of Chicago. An honorary Doctor of Pedagogy degree was awarded to him by Bucknell in 1933.

Dr. Perez began serving as a teacher and principal in the provincial schools of the Philippines in 1909, and was later appointed Superintendent of Vocational Training in the Philippine Bureau of Education.

During World War II, Dr. Perez was interned by the Japanese. He remained in the Philippines after its independence was granted in 1946, serving until his death as a technical adviser to the Government of the young republic.

He is survived by his wife, a daughter, and a son.

Dr. Heber A. Sotzin, who headed the industrial arts department at San Jose State College at San Jose, Calif., since 1929, died on January 6, 1960.

Dr. Sotzin was born September 22, 1893 at Pine Grove, Pa. He received the B.A. degree from George Washington University, Washington, D. C., in 1923, and the

M.A. in 1926 from the same school. In 1929 he received the Ph.D. from the University of Cincinnati.

In his years of teaching from 1915 to 1927, Dr. Sotzin served in the public schools of Indiana, Pennsylvania, and Washington, D. C.

In addition to heading the industrial arts department at San Jose State College since 1929, he taught in summer sessions at the University of Cincinnati, Stanford, University of Utah, Ohio State University, University of Hawaii, Bradley University, and SJSC.

Dr. Sotzin founded Rho Chapter of Epsilon Pi Tau at SJSC in 1938. In 1957 he was elected chairman of the board of trustees of Epsilon Pi Tau.

He was a member of Phi Delta Kappa, American Vocational Association, American Industrial Arts Association, American Council of Industrial Educational Association, and the Association of University Professors, and was listed in Who's Who in America.

In 1957 he was cited by the California Industrial Education Association for outstanding service to industrial education.

Retirements . . .

John F. Friese, formerly professor of industrial education, Pennsylvania State University, University Park, Pa., retired from his position on January 31, 1960.

Dr. Roy G. Fales, one of America's most distinguished leaders of industrial arts education, retired from active service December 31, 1959, after serving 44 years in the field of industrial education. He leaves the position of chief of the Bureau of industrial arts education, New York State Education Department, which he has held since the bureau was organized in 1949.

Dr. Roy G. Fales

Dr. Fales had a wide range of teaching experience in the field of industrial education which included manual training, vocational-industrial education, and industrial arts education. This experience involved service in the elementary schools, junior high schools, and senior high schools. In addition he had extensive teacher training experience at the undergraduate and graduate levels. At the Lincoln School of Teachers College, Columbia University, he developed one of the first comprehensive general shops. The Lincoln School was an experimental one in which many educational practices generally accepted today were developed. His experience in a number of teachers colleges provided him with an excellent understanding of the preparation of industrial arts teachers.

In addition to working closely with the Steering Committee for Industrial Arts, he

(Continued on page 104)

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Silver City, New Mexico

Atop the Continental Divide

PERSONAL NEWS

(Continued from page 102)

was active in the New York State Vocational and Practical Arts Association and the American Vocational Association.

Appointments . . .

● **Dr. Kenneth R. Benson,** B.S., M.A., Ed.D., New York University, has been appointed professor in the industrial arts department at Newark State College, Union, N. J.

Dr. Benson has taught undergraduate courses in industrial arts at New York University from 1946 to 1955, and from 1955 to the present has been teaching graduate courses at New York University.

● **Robert E. Bloomfield,** B.S., from State Teachers College, Fitchburg, Mass.; M.S., and additional graduate work at the University of Connecticut, has been appointed assistant professor in industrial arts at Newark State College, Union, N. J.

Mr. Bloomfield has a rich experience in industry and as a drafting instructor in the Marine Corps. More recently he has been employed as a high school teacher in the Saddle Brook High School.

● **Josiah W. Mullikin,** B.S., Eastern State College, Richmond, Ky.; M.A., New York University, graduate credits from the University of Cincinnati, Broadcasting Station and T. V. License, R.C.A. Institute, New York, has been appointed as assistant professor with a special assignment in the field of electronics at Newark State College, Union, N. J.

In addition to his industrial arts experience in the high school of East Patterson, Mr. Mullikin has been an industrial arts teacher in the Lafayette and George Washington Schools in Morristown, and before that a classroom teacher in the Piqua, Ky., elementary school and later at the high school in Erlanger, Ky.

● **Richard H. Gebhart,** Alexandria, S. Dak., is graduate assistant in drafting and general shop at Northern State Teachers College, Aberdeen, S. Dak.

Mr. Robinson comes from the state of Kentucky where he was State Supervisor of Industrial Education in the State Department of Education for the past two years. While in this position he served as Secretary to the Kentucky Industrial Education Association and was editor of the Kentucky Industrial Education Association Bulletin.

Graduated from Southwest Missouri State College in 1951 with a Bachelor of Science in Education Degree, he taught at Fredricktown, Missouri, for four years. Then during the two years he taught at University City, Missouri, he was chairman of a committee working on "A Guide for Industrial Arts for Grades Seven and Eight." In 1955 he earned his Master of Education Degree at the University of Missouri.

He's a charter member of both the Beta-Zeta chapter of Epsilon Pi Tau, honorary professional Industrial Education Fraternity at S.M.S. and the Kentucky Industrial Education Association, and is a member of the Mississippi Valley I.E. Conference and of the honorary educational fraternity, Phi Delta Kappa.

Mr. Robinson will teach drafting, and shop courses for the school year.

● **Dr. Howard S. Decker,** formerly director of the Division of Arts and Sciences, and Head of the Industrial Arts Department at West Virginia Institute of Technology, Montgomery, W. Va., has recently been appointed head of the industrial arts department at Appalachian State Teachers College, Boone, N. C.

Appalachian State Teachers College, well known throughout the South for its work in both secondary and elementary fields, has recently added industrial arts to its curriculum offerings. A new industrial arts building is planned to offer a well rounded program of industrial arts education.

● **Dr. Donald Racky** has been appointed assistant professor of industrial arts at the Chicago Teachers College. He succeeds Dr. R. Lockette who is now at Trenton State.

Prior to his appointment, Dr. Racky had taught in the evening, elementary, and secondary schools in Chicago. Immediately preceding his new duties, he served as a woodworking teacher at Harrison High School in Chicago.

He received his bachelor's degree from DePaul University, and his master's and doctor's degree of education from Loyola University of Chicago.

● **Dr. Ralph V. Steeb** has joined the staff of the industrial education department, University of Miami, Coral Gables, Fla., as an assistant professor of industrial education.

A graduate of Teachers College, California, Pa., Professor Steeb received his Doctorate of Education degree at the University of Pittsburgh in June, 1959.

● **Daniel C. Lopez** is on sabbatical leave from San Jose State College, working toward the completion of his doctorate at Stanford University.

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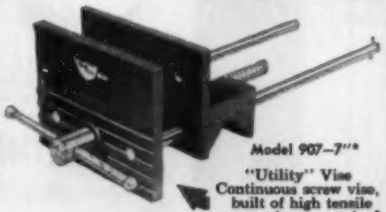

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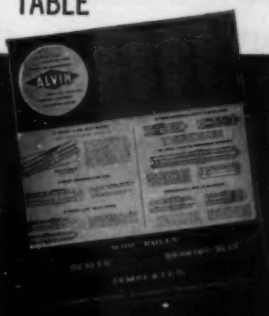

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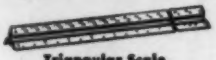

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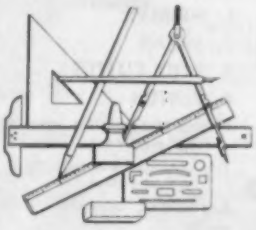

This text is handsomely bound in a spiral binding for convenient use.

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Woodworking

tools

Bench

1. Shop, with hardwood tops, 1¾ in. or over in thickness, the top to project far enough to allow a rapid-acting or continuous-screw vise to be attached. It may be well to order a 1-in. birch or maple board wide enough to cover the working face of the bench at the time of buying the benches. This board can then be fastened to the top proper with screws and may be conveniently replaced when worn. The benches should be made of thoroughly kiln-dried lumber throughout. They may be either plain or of 6-drawer type.
2. Glue bench.
3. Stain, with metal-covered top.
4. Teacher's demonstration.
5. Glue clamp rack.

Bookcase

Bulletin Board

Cabinets

Wood or metal for filing tests, class records, instruction sheets, drawings, finishing materials, hardware, small tools, supplies, etc.

Chairs

Teacher's and tablet arm.

Chalkboard

Permanent or portable.

Core Oven

For patternmaking class.

Desk

Teacher's with drawer compartments.

Drill

Portable electric.

Drill Press

Floor or table model.

Furnace

For melting soft metals (for patternmaking class).

Grinder

1. Bench, motor-in-head. Motor bearings to be completely housed, wheels to be equipped with safety flanges and carefully guarded throughout. One fine-grit, and one coarse-grit wheel.
2. Oilstone, with one fine and one coarse.

Jointer

1. 6- or 8-in. portable jointer. Table to be fitted for rabbeting. Safety-cylinder type, equipped with safety guard.
2. 12-, 16-, or 18-in. direct motor drive, ball bearing. Cylinder to be of safety-head type. Table to be fitted for rabbeting. Jointer to be equipped with safety guard.

Lathes

1. 6- to 16-in. motor-in-head, motor-in-base, or belt-driven speed lathe, to take 24, 36, 48, 60 in. between centers. Each to be complete with cup center, spur center, faceplate, rosette chuck, tool rests, and center drift for head block.
2. Patternmakers', with end faceplate provision. Lathe to be of direct-motor-drive type, equipped with variable speed motor, faceplates and floor stand (for patternmaking class).

Mortiser

1. Direct-motor-drive, or belt-driven, hollow-chisel mortiser, foot feed. Table to be of the tilting type with hold-down clamps and stop rod.
2. Portable, vertical, hollow-chisel mortiser, bench type.

Planer

12-, 18-, 20-, 24-in., motor or belt driven, single-surface planer. Safety-head cylinder, three-knife type, fitted with good-grade steel knives. Knife-setting and jointing device complete with bar should be mounted on machine if possible.

Sander

1. Belt, direct motor drive.
2. Disk, motor or belt driven.
3. Oscillating spindle, motor driven.
4. Portable, hand-plane type, direct motor drive.
5. Vertical spindle and disks sander.

Saws

1. Band saw, 20 to 36 in., motor drive. Upper and lower wheels to be completely guarded. Table to tilt to 45 deg.
2. Cutoff, pedestal or swing type to be fitted with 12- to 16-in. saw.
3. Filing machine, direct motor drive.
4. Jig, direct motor or belt driven.
5. Portable band saw, 14 to 20 in. ball bearing, motor driven.
6. Saw bench, directly connected to motor, and to have both rip and crosscut saws. Rip and crosscut gauges also to be provided.
7. Universal saw bench, 14 to 16 in., motor driven.
8. Variety saw bench, motor driven, tilting table, with universal sliding table. The arbor is to be fitted for a dado head, and the table is to be slotted accordingly. The saw is to be equipped with ripping fence and miter cutoff gauges.

Shaper

1. Motor drive, single or double spindle. Table to be equipped with removable center plate.
2. Portable shaper or router with a suitable selection of cutters.

Tenoner

Single end, with coping heads and cutoff saw.

Vises

Rapid-acting or solid-nut type woodworking-bench vises, 7 to 10 in.

Wood Trimmers

Complete with all gauges and taper pins. Base of trimmer to be slotted and laid out for degree settings (for patternmaking class).

small tools

Awls

Brad, assorted sizes.

Bevels

1. Protractor.
2. Sliding T, 8 in.

Bits

1. Auger, 3/16 to 1 in., inclusive, by 16ths.

equipment and supply listing

Printed annually as an attempt to help you in inventory checking, budget preparation, etc., this annual checklist provides you with a basic guide toward what common machines, tools, and materials are needed in your school shops. The areas served by the lists (together with the editors) include:

1. woodworking (p. 107)
   Louis Barocci
   Cudahy, Wis., schools
2. metalworking (p. 110)
   Harold V. Johnson
   Canton, Ill., schools
3. electricity (p. 113)
   Louis G. Galambos
   Toledo, Ohio
4. automotive (p. 115)
   Harvey Genske
   Milwaukee, Wis., schools
5. printing (p. 119)
   Albert Kosloff
   Chicago, Ill.
6. ceramics (p. 121)
   Ray C. Doane
   St. Paul, Minn., schools
7. drafting (p. 122)

2. Braces, ratchet type, 8-, 10-, 12-in. sweep.
3. Countersink, for wood, rose pattern, ½ in. and ¾ in.
4. Dowel, square shank, ¼ in., 5/16 in., ⅜ in., ½ in., ¾ in.
5. Expansive, ¾ in. to 1½ in.
6. Expansive, ⅞ in. to 3 in.
7. Forstner, square shank, ¼ in. to ½ in. inclusive, by 16ths.
8. Screw driver square shank, ¼ in., 5/16 in., ⅜ in.
9. Gimlet bits ⅛ in. to ¾ in. by 1/16 in.
10. Twist drill for wood, square shank, 1/16 in. to ⅜ in. inclusive, by 16ths.
11. Twist drill, straight shank, 1/16 to ⅜ in. inclusive, by 32nds.

Blowtorch

Brooms

Brushes
1. Bench duster, 10 in.
2. Floor.
3. Glue, round ½ and ¾ in. and 1 in.
4. Marking, camel's hair, No. 1 and No. 2.
5. Varnish, flowing, 2 and 2½ in.
6. Varnish, flat, ½, ¾, and 1 in., and 2 in.

Burnishers
Oval or round.

Can Opener
Wall type.

Carving Tools
1. Sets containing 6 tools.
2. Sets containing 12 tools.

Chisels
1. Cold, machinists', ¾ and ½ in.
2. Mortising chisel and bits, ¼ to ⅜ in. by 16ths.
3. Socket firmer, bevel edge, ⅛, ¼, ½, ¾, 1, and 1½ in.
4. Socket firmer, plain edge, ½, ¾, and 1 in.
5. Tanged firmer, bevel edge, ⅛, ¼, ½, ¾, 1, and 1¼ in.

Clamps
1. Bar, 24, 36, 48, and 60 in.
2. Hand-screw, 4, 5, 6, 7, 8, 10, 12, and 14 in. C-clamps, 6, 8, and 10 in.

Dividers
Wing, 6 in. and 10 in.

Dowel Plate
6 in. long.

Doweling Jigs

Drawknives
7 in.

Drill
1. Automatic hand, with 8 drill points.
2. Chuck, 0 to ¼ in.
3. Hand, 0 to ¼ in., for roundshank drills.
4. Star, for concrete, ½ and ¾ in.

Files
1. Auger bit, assorted, 6 in.
2. Cabinet, 8 and 10 in.
3. Card and brush.
4. Flat, wood, 10 in.
5. Mill, bastard cut, 12 in.
6. Sure form.
7. Round, bastard cut, 12 in.
8. Taper, slim, 5½ and 7 in. Rat tail.

First-Aid Cabinet and Supplies

Gauges
1. Bit, adjustable.
2. Jointer.
3. Marking, metal or hardwood.
4. Mortise, metal or hardwood.

Glass Cutter

Gouges
1. Tanged firmer, outside ground, handled, ⅛, ¼, ½, ¾, and 1 in.
2. Tanged firmer, inside ground, handled, ⅛, ¼, ½, ¾, and 1 in.
3. Spoon, ½, ¾, and 1 in.

Hammers
Claw, bell faced, 10-, 12-, 13-, and 16-oz.

Jars
Earthenware, 1 qt. capacity.

Knives
1. Jointer, to fit power machine (extra set).
2. Planer, to fit power machine (extra set).
3. Sloyd, 3-in. blade.

Levels
1. Wood, 24 in.
2. Machinists', 12 in.

Mallets
Hickory, 3- by 5-in. head.

Nail Sets
1/16- and 5/32-in. points.

Oilers
Bench, ½ pt., coppered, best grade. Non-rigid spout.

Oilstones
1. 1 by 2 by 8 in. in iron box on wood frame.
2. Gouge slip, medium, 4½ by 2½ by 5/16 by 5/16 in.
3. Gouge slip, fine, 3 by 2 by ⅜ by ⅜ in.

Pincers
6 in. carpenters'.

Pinch Dogs
¾, 1, and 1¼ in.

Planes
1. Block, adjustable, 6 in. long, 1⅝-in. cutter.
2. Circular.
3. Combination, adjustable.
4. Core box.
5. Duplex, fillister and rabbet.
6. Fore, ⅛ in., 2⅜-in. cutter.
7. Irons, double.
8. Jack, 14 in., 2-in. cutter.
9. Jointer, 24 in., aluminum.
10. Round, wood, 1¾ in.
11. Router.
12. Smooth, 9 in., 1¾- or 2-in. cutter.

Pliers
1. Roundnose, 5 in.
2. Side-cutting, 6 in.

Putty Knives

Rasps
Half round, wood, 10 in.

Rules
1. Board.
2. 1 or 2 ft. graduated by 8ths and 16ths.
3. Shrink, ⅛ and 7/16 in.
4. 36-in. steel rule in 1/16 in.

Saws
1. Back, 12 in., 14 point.
2. Band, to fit power machine.
3. Compass, 10 in.
4. Coping, frames.
5. Coping, blades.
6. Crosscut, 9 tooth, 22 in. long.
7. Crosscut, circular for power machine.
8. Dado, ⅛ to 1 1/16 in. to fit power-saw arbor.
9. Hack, frames, 10 in. or adjustable.
10. Hack, blades, 10 in.
11. Keyhole, 10 in., 10 point.
12. Rip, 7 point, 22 in. long.
13. Rip, circular for power machine.
14. Set, 10 points uper inch and finer.
15. Set, 10 points per inch and coarser.
16. Turning frame, 14 in.
17. Turning blades, 5/16 by 12 in., 10 tooth.
18. Miter box, 24 by 4 in. saw, 7 in. capacity at miter.

Scrapers
1. Cabinet.
2. Glue, triangular.

Screw Drivers
1. Cabinetmakers', 4, 6, 8, and 10 in.
2. Quick return, spiral ratchet.

Snips
Tinners', forged steel, 2½-in. cut.

Spokeshaves
Adjustable, raised handle, 10 in. long.

Squares
1. Combination, 12 in.
2. Try, iron handle, 8 in.
3. Framing, 2 ft.

Steel Figures
Hand cut, ⅛ in.

Tapeline
50 ft., steel.

Trammel Points
Adjustable metal frame, steel points.

Turning Tools
1. Calipers, 6 in. inside and outside.
2. Calipers, 12 in. inside and outside.
3. Parting tools, ⅛ in.
4. Round point, ¼, ½, and ¾ in.
5. Spear point, ¼, ½, and ¾ in.
6. Square point, ¼, ½, and ¾ in.
7. Turning chisels, ¼, ½, and ¾ in.
8. Turning gouges, ¼, ½, and ¾ in.
9. Turning skews, L.H., ¼, ½, and ¾ in.
10. Turning skews, R.H., ¼, and ½ in.

Vise
3-in. jaw, anvil face.

Wrenches
1. Slim, ¼ in. to 1 in. by ⅛ in. variation.
2. Adjustable, 8, 10, and 12 in.
3. Headless setscrew.
4. Pipe, 10 and 12 in.
5. S type or open-end type to fit ⅛ in. to 1-in. N.C. nuts.

materials and supplies

Alcohol

Benzine

Brads
⅜, ½, and ⅝ in. No. 20; ¾ and ⅞ in. No. 19; 1 in. No. 18; 1¼ and 1½ in. No. 16; 1¾ in. No. 15; 2 in. and 2½ in. No. 14.

Carbon Paper
Black.

Colors
Dry: burnt sienna, burnt umber, cobalt blue, chrome yellow, drop black, lamp black, Prussian blue, raw umber, Vandyke brown, and vermillion.

Colors
Ground, in oil or japan; burnt sienna, burnt umber, cobalt blue, chrome yellow, drop black, lamp black, Prussian blue, raw umber, rose lake, Vandyke brown, and vermillion.

Decalcomania Transfers

Dowel Pins and Plates

Dowels
Hardwood, 3-ft. lengths, ¼, 5/16, ⅜, ½, ¾, and 1 in.

Enamel
1. Selected colors.
2. Undercoater.

Fillers
Paste: natural oak, dark oak, mahogany, white, and walnut.

Fillets
Leather, ¼ and ½ in.

Glue
1. Casein, hide, best grade cabinet.
2. Liquid, white glue.

Hardware
Brackets, buttons, butts, casters, catches, chain, chest corners, chest hinges, chest trimmings, corner braces, corner irons, corner plates, door fittings, escutcheons, fasteners, handles, hangers, hinges, hasps, holders, hooks, knobs, latches, lamp fittings, lid supports, locks, pulls, smoking-stand outfits, springs, stops, supports, table top fasteners.

Hooks
1. And eyes.
2. Cup.
3. Screw.
4. Square screws.

Lacquer
Black, clear, ivory, medium green, red, thinner, white, and yellow.

Lumber
Ash, balsa, bass, birch, cherry, cypress, locust, mahogany, maple, oak, poplar, red cedar, red gum, redwood, sap gum, yellow pine, walnut, white pine.

In ordering pine, mill run, kiln dried will be found suitable for carpentry, while short, select, kiln dried, 4 in. and wider or No. 1 shop common, kiln dried will be required for cabinetmaking and pattern-making.

Hardwood for furniture should be specified first and second grade, kiln dried, standard widths and lengths, or short lengths.

Moldings
Assorted.

Nails
1. Common, 6d, 8d, and 10d.
2. Flathead, ½ in. No. 20, ¾ in. No. 19, 1 in. No. 18, 1¼ in. and 1½ in. No. 16, and 2 in. No. 14.
3. Finishing, 4d, 6d, and 8d.

Oil
1. Linseed, boiled.
2. Linseed, raw.
3. Machine.
4. Rubbing.
5. Lubricating.

Overlay Carvings
Panel or Plywood
3 ply, 5 ply, and 7 ply. ¼ in. ⅜ in. and ½ in.

Pins
Escutcheon.

Pumice Stone
No. 0.

Rottenstone
Sandpaper
Garnet cabinet paper, 3/0, 2/0, 0, ½, 1.
Garnet finishing paper, 6/0, 4/0 also No. 360 finishing paper.

Garnet paper can also be obtained in rolls of 50 yd. in widths 4 in. up to 48 in. Narrower widths on special order.

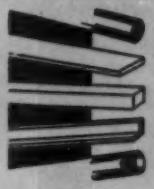
Screw Eyes
Screws
1. Flathead, brass, No. 3 by ⅜ in., No. 4 by ½ in., No. 5 by ⅝, and ¾ in., No. 6 by ¾ in., No. 7 by ⅞ in., No. 8 by 1 in., No. 10 by 1¼, 1½ and 2 in., No. 12 by 1¼, 1½, and 1¾ in.
2. Flathead, bright, No. 3 by ½ in., No. 4 by ½ in., No. 6 by ¾ in., No. 7 by ⅞ in., No. 8 by 1, and 1¼ in., No. 10 by 1¼, 1½, and 1¾ in., No. 12 by 1½, 1¾, and 2 in., No. 14 by 2¼ and 2½ in. and 3 in.
3. Oval head, brass, No. 5 by ¾ in., No. 6 by ¾ in., No. 7 by ⅞ in., No. 8 by 1 in., and No. 10 by 1¼ in.
4. Roundhead, blued, No. 3 by ⅜ and ½ in., No. 5 by ¾ in., No. 6 by ¾ in., No. 7 by ⅞ in., No. 8 by 1 in., No. 10 by 1¼, and 1½ in., No. 12 by 1½ in.
5. Roundhead, brass, No. 3 by ⅜ in., No. 4 by ½, and ⅝ in., No. 5 by ¾ in., No. 6 by 1 in.

Shellac
1. Orange, cut 4 lb. to the gal.
2. Sticks, assorted colors.
3. White, cut 4 lb. to the gal.

NOTE: Shellac should be kept in glass or earthenware containers. Do not overstock shellac. It loses its quick drying feature and remains "sticky."

HOSSFELD #1 Universal®

Iron Bender Bends

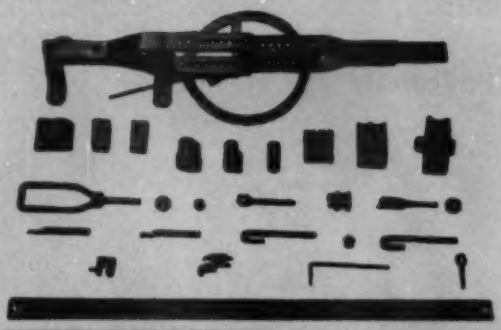


ROUND, FLAT, SQUARE } BAR STOCK
ANGLE IRON
PIPE

HOSSFELD #1 BENDER. STANDARD EQUIPMENT INCLUDES ALL-PURPOSE DIE SET.

35 Years' Metal Bending Experience

TOPS AS A TEACHING TOOL • FIRST IN ITS CLASS • IDEAL FOR ORNAMENTAL IRON WORK, EYE BOLTS, AUTOMOBILE SPRING EYES



5 REASONS WHY:
1. **WRENCHLESS:** Ready to use
2. **PRACTICAL:** Quick setup
3. **ADAPTABLE:** Replaces special equipment
4. **VERSATILE:** Reproduces practically any everyday bend
5. **INVALUABLE:** As indispensable as a bench vise

FREE: Write for illustrated Bender Bulletin.

HOSSFELD MFG. CO.
438 W. 3rd Street • Winona, Minnesota

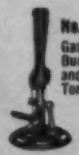
QUIET!

Gas Fired BUZZER Professional Type
FURNACES and BURNERS
recommended by leading shop instructors for quiet safe efficient shop work

NO BLOWER OR POWER NEEDED — JUST CONNECT TO GAS SUPPLY
- well behaved "Buzzer" hardly whispers in shop class, no more shouted instructions.
- uses only low pressure gas of any type, and less of it for any particular job.
- self-contained "packaged" units with pilot always ready for work, students operate as simply and safely as a home gas range.
- no blower or electricity, avoids extra expense plus dangers of "whooshing" flame and short circuits.
- heavily lined with individual insulating firebrick for shop comfort, longer refractory life, furnace safety.
- authentic, professional design prepares students better for industry.
- thermo pilots and temperature controls available for easy attachment.

No. 170 High Temperature Melting Furnace.

No. 43 Portable Soldering and Bench Furnace.



No. 14 Gas Burner and Torch.

No. 55 Bench Type Heat Treating Furnace with stand.

Since 1911 "BUZZER" gas-fired Furnaces and Burners have been preferred the world over for their outstanding advantages in industry and schools. Ask any heat treater or shop instructor who uses them. We invite inquiries for your particular school shop layout. Local "BUZZER" sales and servicing representatives throughout the country.

Write today for "BUZZER" CATALOG NO. 1570A

CHARLES A. HONES, INC.
159 So. Grand Ave., Baldwin, L. I., N. Y. • BAldwin 3-1110
"BUZZER" Burners & Furnaces for Heat Treating, Melting, Soldering

Stains
Oil, spirit, or water. Fumed oak, dark oak, golden oak, light oak, mahogany, walnut, blond, grey, white, red maple.

Steel Wool
No. 0 and No. 2/0.

Turpentine

Twine

Varnish
Coach, flat, remover, spar, rubbing, dull, and satin finish.

Waste
Cotton, white.

Wax
Bees and finishing. Furniture polish.

White Lead

White Outdoor Paint

Metalworking

tools

Engine Lathes
9 in. to 16 in.

Drill Presses
Bench.
Large.

Milling Machines
Plain, No. 2.
Vertical.

Shaper
16 in. to 24 in.

Grinders
Bench.
Cylindrical.
Pedestal.
Surface.
Tool post.
Universal tool and cutter.
Wet.

Planer
24 x 24 in.

Radial Drill
3 ft.

Saws
Metal, band.
Power, hack.

Arbor Press

Heat Treating Furnace

Pyrometer

Lathe Milling Attachment

Lathe Taper Attachment

Arc Welder
200 amp.

Oxy-welding and Cutting Outfit

Chain Hoist
2 ton.

Air Compressor
4 ft. to 15 ft. capacity.

Dividing Head

Hardness Testing Machine

Die Filing Machine

Anvil
100 lb.

Electric Drill
Portable.

small tools

Arbors
Drill chuck, to suit requirements.
Reamers, various sizes.
Shell tool, various sizes.
Straight shank, for shell reamers and shell drills.
Taper shank, for shell reamers and shell drills.

Bearing Scraper

Benches

Bevel Protractor

Blowtorch

Brooms
For shop.

Brushes
Bench.
Floor.

Calipers
Hermaphrodite, 4 in. to 6 in.
Micrometer, outside, 0–1 in., 1–2 in., 2–3 in., 3–4 in.
Micrometer, inside, 1½–8 in.
Inside, 4 in. and 6 in.
Outside, 4 in. and 6 in.
Inside-outside vernier.

Indicators
Center.
Universal dial.
Speed.

Inspection Equipment
Dial snap gauge.
Dial bore gauge.
Bench micrometers.
Gauge blocks.
Bench centers.
Electronic measuring and inspecting equipment.
Intrimik.

Knurling Tool
Combination.

Lathe Dogs
Assorted sizes.

Level
Precision.

Ladle
Melting, 6 in.

Mandrels
Selected sizes.

Nippers
End cutting 5 in.

Oil Storage Tank
With pump.

Oilers
Solderless steel, bent spout.

Parallels
Adjustable.
Plain, assorted sizes.

Pliers
Slip joint.
Long nose.
Electrician's.
Side cutters.

Punches
Center, ⅛ in. and ¾ in.
Hollow, ½ in., ¾ in., 1 in.
Pin, assorted sizes.
Prick, ¼ in.

Planer gauge

Ratchet Threader
⅛ to ¾ in. pipe.

Reamers
Hand, various sizes.
Adjustable, various sizes.

Rivet Sets
Assorted sizes.

Rules
6 in., #4 graduation.
12 in., #4 graduation.

Scales
Shrink.

Screw Drivers
6 in. and 9 in. blades.

Scrapers

Screw Plate
Combination, ¼ to 1 in.

Scribers

Line Bar

Snips
Straight.
Curved.

Sockets
For taper shank drills, #1, #2, and #3 Morse taper.

Soldering Copper
Electric.

Squares
Machinist, 12 in.

Surface Plates

Steel Figures
⅛ in.

Steel Letters
⅛ in.

Tapeline
50 ft.

Toolmaker's Buttons

Tapping Attachment

Taps and Dies
Machine screws.
Pipe.
N.F., ¼ in. to ¾ in.
N.C., ¼ in. to ¾ in.

Cans
Oil, ⅛ pint and 1 pint.

Center Testers

Chisels
Cape, ¾ in. and ¾ in.
Cold, alloy steel, ½ in. and ¾ in.
Diamond point, ¾ in. and ½ in.
Round nose, ¾ in. and ½ in.

Collets
Lathe.
Milling machine.

C Clamps
Assorted sizes.

Combination Squares
9 in. and 12 in., with hardened square, protractor, and center heads.

Counterbores
Straight shank and tapered shank, assorted sizes.

Countersinks
Combination.
Plain.

Cutters
Milling, assorted.

Dividers
Spring, 4 in. and 6 in.

Drills
Drifts.
Sleeves, different sizes.
Number, #1 to #60.
1/16 in. to ½ in., by 64ths.
Center.
High speed steel, taper shank, various sizes.
Straight shank, 1/16 in. to ½ in. by 64ths.
Ratchet.
Taper shank, ½ in. to 1½ in. by 16ths.

File Cards

Files
Die sinker's, various shapes.
Flat bastard, 8 in., 10 in., 12 in., and 14 in.
Half round double cut, 6 in., 8 in., 10 in., and 12 in.
Hand, smooth, 8 in., 10 in., and 12 in.
Mill, smooth, 8 in., 10 in., and 12 in.
Square bastard.
Swiss, various shapes.
Warding, double cut.

First-Aid Cabinet and Medical Supplies

Gauges
Center.
Depth.
Drill and wire.
Screw pitch.
Surface.
Thickness.

Glasses
Safety.

Hack-Saw Blades
Hand, 10 in., 18 teeth.
Power, 12 in., 14 teeth.
Band saw, ⅛ in. to ½ in., 14 pitch, .025 gauge, 100 ft.

Hack-Saw Frames
Adjustable.

Hammers
Babbitt.
Ball peen, assorted sizes.
Soft face.
Riveting.
Setting.

Thread Wires
Flynn, 14 sets.

Trammels
24-in. set.

Tool Holders
Boring.
Cutting-off.
Planer.
R.H. and offset shank.
Shaper.
Slotter.
Straight shank.
Threading.

Tool Cutter Bits
Square, ¼ in., 5/16 in., ⅜ in., and ½ in.

V Blocks and Clamps

Wheel Dressers
For off hand grinder.
For surface grinder, diamond point.

Wrenches
Adjustable.
Single and double open-end.
Ratchet socket.
Adjustable hook spanner.
Pipe.
Tap, T-handle.

Vises
Machinist's, 4 in.

sheet metal

Awls
Scratch.
Ring.
Tinner's.

Bar Folder
30 in.

Benches
Sheet metal, with stake plate, 3 shelf, 60 x 40 x 32 in.
Work, steel, 72 x 28 x 36 in.

Box Brake
36 in.

Crimping and Beading Machine

Dividers
Wing, 10 in.

Drills
Straight shank, 1/16 in. to ½ in.

Furnace
Bench, gas, soldering.

Hammers
Riveting.
Tinner's.
Cross peen.
Ball peen, 8 oz., 10 oz.
Tinner's setting.
Hand groovers, 2, 3, 4.

Hand Reamer

Plumber's Scraper

Punches
Center, ⅛ in. stock.
Prick, ⅛ in. stock.
3, 4, 5, 6.

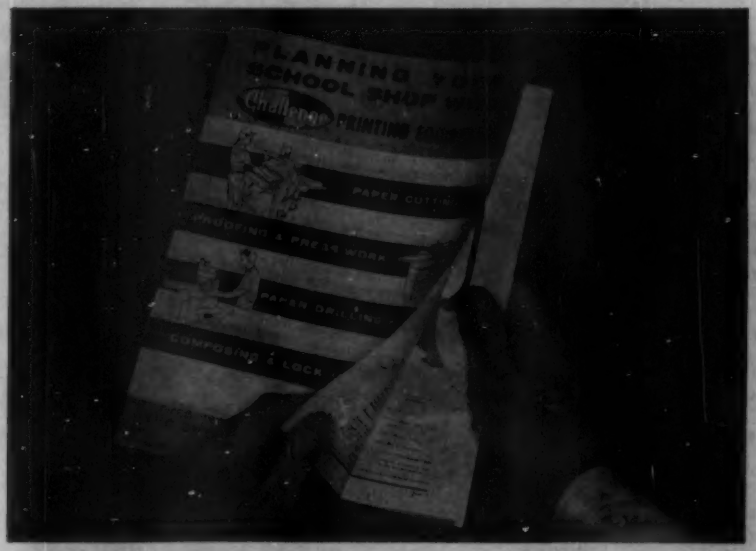
Rules
Steel flexible.
Circumference, 3 ft.

Soldering Coppers
Electric, ½ in.
½ lb., 1 lb.

Stakes
Hollow mandrel.
Double seaming.
Blowhorn.
Conductor.
Needle case.
Creasing.
Candle mold.
Bottom.
Square.

Tin Snips
Curved lip.
Hawk bill.
Compound lever, 8 in.

Slip Roll Former
36 in.



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bench metal

Bending Jig

Bending Machine

Bolt Cutters
No. 0, 18 in.

Chisels
Cold, 3/4 in. and 1/2 in.

Calipers
Inside, 8 in.
Outside, 8 in.

Rivet Sets

Clamps
Toolmaker's, 3 in.
Carriage, 4 in. to 8 in.
Jorgensen, #2

Drills
Straight shank, set.
Electric, hand.
Breast.

Files
Flat, 8 in., second-cut.
Mill, 10 in., second-cut.
8 in., smooth-cut.

Hammers
Ball peen, 16 oz.
Cross peen, 16 oz.

Gauge
Sheet and plate.

End-Cutting Nippers

Pliers

Punches
Center.
Prick.

Rules
12 in. and 24 in.

Safety Glasses

Screwdrivers
6 in. and 8 in.

Squares
24 in.
Combination.
Try, 10 in.

Scriber

Saw
Hack
Jeweler's, piercing, 5 in.

Tinner's Snips
Straight.
Curved.

Taps and Dies
N.C.
N.F.

Vises
Machinist's bench.
Pipe.

Wrenches
Box, 1/4in. to 1 in.
End, 1/4 in. to 1 in.
Crescent, 6 in., 8 in., 10 in.

art metal

Anvils
Flat, round head.
Flat, square head.
Mushroom head.

Chisels
Chasing.
Matting.
Engraving.

Dome Anvil Head

Files
Flat, 8 in., bastard.
Flat, 8 in., smooth cut.
8 in., second-cut.
Needle.

Grinders
Buffing.
Stone.

Drills
Straight shank, set.

Hammers
Ball peen, 8 oz., 12 oz., and 16 oz.
Chasing.
Forming.
Planishing.
Art peening.
Art metal.
Embossing.

Lathe
Metal spinning, 15 in.

Mallets
Wood.
Rubber.
Fiber.
Rawhide.

Metal-Spinning Tools, Set

Master Extension Arm

Saws
Jeweler's, 5 in. deep
Hack.

Slope Anvil Head

Squares
Combination.
Try, 10 in.
Bevel

T Stakes
Assorted.

foundry

Bellows
Molder's.

Barrows
Coke.
Foundry.
Scrap.

Bench Rammer

Bulb Sponge

Benches
Core making.
Molding.

Blowers
For furnaces.

Core Oven

Crucibles

Cupola
For foundry coke, or electric; capacity, 1/4 to 1 ton.

Flasks
2- or 3-part, steel, or snap type.

Furnace
Gas, with blower, for melting non-ferrous metals.

Grinder
Floor model.

Hand Picks
For cleaning inside of cupola, 1/14 to 2 1/2 lb.

Handles
Pouring, crucible.

Pyrometer

Riddles
Foundry.

Rack for Flasks

Sand Sifter

Safety Glasses

Sand-Blast Outfit

Snapback Jackets

Spoon and Gate Cutter

Slick and Oval

Sprue Cutter

Trowel
Finishing, 6 in.

Taper and Leaf Slick

Tongs
Crucible.

Tumbling Barrel

materials and supplies

Abrasive Cloth
Aluminum oxide. Grits 320 to 24, obtainable in sheets or rolls.

Abrasive Wheels

Acetylene Gas
In drums for welding.

Aluminum
1. Pigs for foundry.
2. Sheets, tubing, rounds, shapes, wire, etc.
3. Aluminum circles for spinning, 4" to 15" dia., 20 to 18 ga.

Babbitt Metal

Bearing Blue

Belt Dressing

Belt Lacing Material

Belt Leather

Belts
1. Carriage, selected sizes.
2. Lag, selected sizes.
3. Machine, selected sizes.
4. N.F., selected sizes.
5. Stove, flat or roundheads, selected sizes.

Brass
1. Bars, 3/32, 1/4, 3/16, and 1/4 in. thick; 3/4 to 1 in. wide, 8 to 10 ft. long, selected sizes.
2. Round rods, 5/16 to 1/2 in. by 16ths, selected sizes.
3. Sheets, 28 to 32 American gauge, 12 in. wide by 72 to 84 in. long, selected sizes.
4. Strips, 1/32 and 1/16 in. thick, 1/2 to 1 1/2 in. wide, 50 ft. to a coil, selected sizes.
5. Threaded rods, Nos. 6 to 10, in 24 in. lengths, Nos. 12, 14, 1/4, and 5/16 in., in 24 in. lengths, selected sizes.
6. Wire, soft, 8, 11, and 14 American gauge, selected sizes.
7. Wire, spring, 8 to 22 American gauge, selected sizes.

Casehardening Compounds

Chaplets
Single and double head.

Coal
1. Charcoal for foundry or forge.
2. Coke for foundry.
3. Forge.

Copper
1. Sheets, 8 to 25 American gauge, 30 by 60 in., selected sizes.
2. Tubing, outside diameters, 3/16, 1/4, 5/16, 3/8, and 1/2 in.; thickness of wall, 1/32 in.; lengths, 8 to 12 ft., selected sizes.
3. Wire, soft, 2 to 20 American gauge, in coils. Also in 1/4, 1/2, and 1 lb. spools, sizes 16 to 36, English gauge, selected sizes.

Core
1. Compounds.
2. Flour.
3. Paste.
4. Oil.
5. Wax-vent wire.

Cutting Compounds

Etching Material for Art Metal

Firebricks and Clay
For foundry.

Fire Handles
Assorted sizes.

Graphite
For foundry.

Iron
Pig, for foundry.

Lacquer
Transparent and colored, for finishing.

Lubricant
Metal spinning.

Nuts
S.A.A., acorn cap, castellated, square, hexagon, joint, and wing, selected sizes and kinds.

Oil
1. Boiled linseed.
2. Lubricating.
3. Quenching and hardening.

Packing
Round, sheet, square, or tubular.

Paint
Black asphaltum.

Pins
1. Cotter, 5/32 to 1/4-in. diam. from 1/2 to 2 in. long.
2. Flask, for flask repairs.
3. Taper, Nos. 0 to 6, 3/4 to 2 in. long.

Pumice Powder

Rivets
1. Copper, with burrs, Nos. 7 to 14, lengths, 1/4 to 3/4 in., selected sizes.
2. Iron, No. 14 gauge to 5/16 in., flathead or button head, 1/4 to 1 in. long, selected sizes.
3. Tinners', flathead, 8 oz. to 16 lb., either tinned or black, selected sizes.

Sand
1. Molding in 350-lb. barrels or 800-lb. casks.
2. Parting, in 350-lb. barrels or 800-lb. casks.

Screws
1. F.H. or R.H. iron or brass, selected sizes and kinds.
2. Cap and machine, iron or brass, selected sizes and kinds.
3. Set, head and headless.

Solder
Acid or rosin core; bar, or solid wire.

Soldering Paste or Salts

Steel
1. Bessemer, rod, 1/64 to 3/8 in. by 64ths, in 4-ft. lengths, selected sizes.
2. Bars, cold rolled, 1/8 to 3/8 in. thick, 1/2 to 2 in. wide, 12-ft. lengths, selected sizes.
3. Drill rod, letter sizes, A to Z, number sizes, 1 to 80, in 3-ft. lengths, selected sizes.
4. Rods, hexagon and square, cold rolled, 1/4 to 3/4 in., in 12-ft. lengths, selected sizes.
5. Round, cold rolled, diameters 1/4 to 1 in., lengths 12 ft., selected sizes.
6. Sheet, black, Nos. 18, 20, 22, 24, 26, 28, U. S. gauge; size of sheets, 24, 28, and 30 in. by 96 in.
7. Sheet, galvanized, Nos. 18, 20, 22, 24, 26, 27, and 28, U. S. gauge; size of sheets, 24, 28, and 30 in. by 96 in., selected sizes.
8. Threaded rods, Nos. 6 to 10, in 12-in. lengths, Nos. 12, 14, 1/4 in., and 5/16 in., in 24-in. lengths, selected sizes.

Tin
1. 1C, 1X, 20 by 48 in.
2. 1XX, 20 by 48 in.

Washers and Burrs
1. Copper burrs, Nos. 3 to 14, in 1-lb. boxes.
2. Iron burrs, Nos. 3 to 14, in 1-lb. boxes.
3. Brass washers, 5/16 to 1/2 in. by 16ths.
4. Iron washers, 5/16 to 1/2 in. by 16ths.

Welding Fluxes

Welding Rods
(All rods come in 24-in. lengths).
1. Brazing, 1/16, 1/8, 3/16-in. diameter.

Wire
1. Annealed, 16 to 34 W and M gauge, selected sizes.
2. Coppered market, 5 to 18 W and M gauge, selected sizes.
3. Coppered spring, 2 to 18 W and M gauge, selected sizes.
4. Galvanized, 5 to 18 W and M gauge, selected sizes.
5. Piano, Nos. 2/0 to 36, selected sizes.
6. Tinned, 16 to 24 W and M gauge, selected sizes.
7. Wool, Nos. 0 to 3 in 1-lb. packages, selected sizes.

Zinc
1. Sheet, Nos. 4 to 14, sheets 36 by 84 in.
2. Cast aluminum, 5/16, 1/4, and 3/8-in. diameter.
3. Cast brass, 5/16 and 3/8-in. diameter.
4. Cast bronze, 1/4-in. diameter.
5. Cast copper, 3/16 and 1/4-in. diameter.
6. Cast iron, 3/16, 1/4, 5/16, and 3/8-in. diameter.
7. Low carbon steel, 1/4, 5/16, and 1/4-in. diameter.

White Lead
For machine shop.

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24" x 30" WALL TEACHING CHART
of full 5 Tube AC-DC Radio
FREE with purchase of our famous Guide
HINTS TO TEACHING ELECTRICITY AND ELECTRONICS
50 page booklet, photograph of circuit, charts, 14 schematics — Send $1 check with order.

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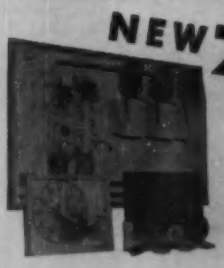

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SAME FAMOUS EE SYSTEM NOW IN USE IN 27 STATES — Large, 30" x 48" — all parts — 13 tubes — power supply — 3 Electric Decimal Counters
COMPLETELY SELF-CONTAINED — $600.00
NEW SPECIAL MANUAL FOR COMPUTER DEMONSTRATOR — shows how to develop Basic Computer Concepts from simplest analog principles to complex circuitry —
UNIT COUNTS AT RATE OF 100,000 PER SECOND!

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P O BOX 5595 WASHINGTON 16, D C

Electrical Shop

testing and motors

Annunciators
1. Automatic needle drop.
2. Gravity drop.
3. Manual needle drop.

Armatures
Burnt out, for repairing.

Armature Tester
Growler.

Battery Charger
Commercial.

Circuit Breakers
1. Air, single pole, overload, 25 amp., 550 volt.
2. Air, single pole, underload, 15 amp., 550 volt.

Controllers
1. For multiple-speed motor.
2. For 1 h.p., 110-volt series.

Generators
1. Motor-generator set, 10 h.p., to supply 110-volt d.c. for testing purposes, battery charging, etc.
2. Generator, 6-volt d.c. coupled to an a.c. motor for 6-volt circuit testing.
3. Auto generators of different makes.

Gravity Cells

Magnets
Testing, 10,000 ohm.

Meters
1. Ammeter, standard, 60 amp., a.c.
2. Ammeter, standard, 60 amp., d.c.
3. Ammeter, student, 60 amp., a.c.
4. Ammeter, student, 60 amp., d.c.
5. Voltmeter, standard, 0–10 volt, d.c.-a.c.
6. Voltmeter, standard, 110–220.
7. Voltmeter, standard, 125 volt.
8. Voltmeter, standard, 125 volt, d.c.
9. Voltmeter, student, 110 volt, d.c.
10. Voltmeter, student, 110 volt, a.c.
11. Wattmeter, standard, 110-220 volt, 30–60 amp., d.c.-a.c.
12. Wattmeter, student, 110–220 volt, 30 amp., a.c.-d.c.
13. Watt-hour meter, 125 volt, 5 amp., a.c., single phase, various makes.
14. Volt-OHM-Millimeter.
15. Voltage indicators — jumping jacks.

Motors
1. Auto starter, different makes.
2. Burnt out, fractional h.p., 110 volt, 60 cycle, for repairing.
3. Compound, 1 h.p., 110 volt, d.c.
4. Multiple speed, 1 h.p., 3 phase, 220 volt.
5. Series, 1 h.p., 110 volt, d.c.
6. Shunt, 1 h.p., 110 volt, d.c.
7. Split phase and repulsion, a.c., 110 volt, single phase, assorted.
8. Split phase induction motors, fractional h.p., 110 volt, 60 cycle, different makes.
9. 3 phase, 1 h.p., a.c., 220 volt, various makes.
10. 3 phase, 2 h.p., 220 volt, a.c., various makes.
11. Universal, fractional h.p., 110 volt, different makes.
12. Universal, variable speed, 1/2 h.p.

Platform Scale
110 lb. capacity.

tools

Bench Grinder

Benches
Plain or with drawers, for tools and equipment, or with compartments for the storing of wiring panels. Preferably they should have electrical outlets and circuit breakers.

Bits
1. Auger, 1/4 in. to 1 in. by 16ths.

2. Auger, $1\frac{1}{16}$ in., 18 in. long.
3. Drill for wood, square shank, ⅛ in. to ½ in. by 16ths.
4. Expansion.
5. Extension, 18 in.
6. Screw driver, ¼ in.

Blackboard
Permanent or portable.

Blowtorches
1 qt. size.

Bookcase

Braces
Ratchet type, 8-in. swing.

Bulletin Board

Cabinets
Wood or metal for filing class records, instruction sheets, drawings, etc.

Chairs
Teacher's and tablet arm.

Compass Saw

Coil
1. Spreader.
2. Taper.
3. Winder.

Desk
Teacher's, with drawer compartments.

Drill
1. Breast.
2. Concrete, ⅜ in., ½ in., ¾ in., 1 in.
3. Hand.
4. Portable, electric.
5. Twist, $\frac{1}{32}$ in. to ½ in. by 64ths.

Drill Press
1. Bench, hand, or power driven.
2. Heavy, power driven.

Files

First-Aid Cabinet and Supplies

Hack Saw
1. Blades, 10 in., 24 tooth.
2. Frames, adjustable.

Hammers
1. Claw, 12 oz.
2. Machinist's, ball peen.

Hickey
½ in. and ¾ in.

Hole Saws
Selected sizes.

Lathe
1. Engine, 10-in. or 12-in. swing, 6 ft. or 8 ft. long.
2. Speed.

Pliers
1. Gas, 6½ in. and 8 in.
2. Side cutting, 6 in.

Punch
For metal molding.

Punches
Assorted.

Reamers
1. Pipe burring, ¼ in. to 1 in.
2. Pipe burring, ½ in. to 2 in.

Rules
1. 48 in. zigzag.
2. 72 in. zigzag.

Screw Drivers
3 in., 5 in., and 8 in.

Shears
For cutting metal molding.

Solder Dippers

Soldering Coppers and Guns
1. Assorted.
2. Electric.
3. Handles.

Stocks and Dies
For pipe threads, ½ in. to 1 in.

Vises
1. Machinist's, 4 in.
2. Pipe.

Wrenches
1. Adjustable, 6 in. and 8 in.
2. Pipe, 10 in., 12 in., and 14 in.
3. Socket, combination.

materials and supplies

Abrasive Cloth
Aluminum oxide, 1, 1½, and 2 in. wide.

Armored Cable
1. 2 wire, No. 14, single strip.
2. 3 wire, No. 14, single strip.
3. Box connectors.

Attachment Plug

Bar Hangers

Batteries
Dry cells.

Battery Acid
1.300.

Battery Sealing Compound

Box Cleats

Brads
¾ in., No. 19 and 1½ in., No. 16.

Brake Lining
¼ by 2 in.

Brushes
Carbon, for motors and generators.

Burglar Contacts
1. Open circuit.
2. Closed circuit.

Bushings
1. Loom, No. 1 and No. 2.
2. "Jiffy" loom, No. 2.

Buzzers

Cleats
Unglazed porcelain, 2 wire.

Clips
Test, with insulators, Universal Nos. 22, 23, 24 and 25.

Commutator Cement

Conduit
1. Bushings, ½, ¾, and 1 in.
2. Box connectors, for flexible.
3. Couplings, for flexible.
4. Lock nuts, ½, ¾, and 1 in.
5. Rigid, ½, ¾, and 1 in.

Condulet
1. Fillings, ½ in., LL, LR, and LB.
2. Covers, ½ in., blank.

Door Openers
Mortised.

Fish Paper
.0125 in. thick.

Fixtures
Brass, chain, suspension.

Fixture Studs

Fuses
1. Plug type, renewable, 125 volt, 15 amp.
2. Cartridge type, renewable, 125 volt, 30 amp.
3. Renewals for plug fuses.
4. Renewals for cartridge fuses.

Ground Clamps
⅜ to 1 in. assorted.

Hickey Grips
½ and ¾ in.

Lamps
1. Mazda, selected as wattages and voltages.
2. Guards for brass sockets.

Lugs
25 and 50 amp. Solder and solderless.

Lumber
2 by 4 in. by 14 ft., No. 1, white pine dressed, 4 sides.

Molding
1. Metal.
2. Metal, fittings — crosses, T's, internal elbows, junction boxes, switch bases, keyless receptacles, snap switches.

Nuts
Iron, 4-36, 6-32, 8-32, 10-24, 12-24, 10-32, 14-20.

Outlet Boxes
4 in. square, with one round blank cover, and one cover with bushed opening.

Pipe Straps
Galvanized, ⅜, ½, ¾, and 1 in.

Push Buttons
1. Return call, 3 point.
2. Single.

Receptacles
1. Flush, duplex.
2. Porcelain cleat, 660 watt, 250 volt.
3. Concealed.
4. Covers.

Rectifiers
Tungar, for charging from 1 to 12, 6- and 12-volt batteries.

Relays
Dixie.

Resistance Boards
For testing.

Resistance Units
125-ohm.

Rheostats
1. Compression, 275 watt.
2. Field, for shunt and compound motors.

Rosettes
Wood.

Rotary Converter
5-kw. capacity, 3 phase a.c., 110 volt d.c.

Screws
1. Anchors, 8/32, 10/24, 12/24, 14/20.
2. Machine, roundhead, 4-40 by ¼ in., 6-32 by ½ in., 6-32 by ¾ in., 8-32 by ⅜ in., 8-32 by ½ in., 8-32 by 1 in., 10-32 by ⅜ in., 10-24 by ⅜ in., 10-24 by ¾ in., 10-32 by ¾ in., 12-24 by 1 in.
3. Machine, brass, roundhead, 4-40 by ¼ in., 6-32 by ½ in., 6-32 by ¾ in., 8-32 by ½ in.
4. Wood, flathead bright, No. 5 by ¾ in., No. 8 by ½ in., No. 8 by ¾ in., No. 8 by 1 in., No. 7 by 1½ in., No. 8 by 1½ in., No. 7 by 2 in.
5. Wood, roundhead blued, No. 7 by 1 in., No. 8 by 1½ in., No. 10 by 1½ in., No. 7 by 2 in.

Sleeving
No. 1, white; No. 1, blue; and No. 1, red.

Sockets
1. Brushed, brass pull chain, keyless, key.
2. Porcelain, keyless, with caps.
3. Porcelain, key, with caps.

Socket Caps
¼ and ⅜ in. brushed.

Solder Wire
50/50 size, No. 10.

Soldering Paste
2-oz. cans, noncorrosive.

Soldering Salts
1-oz. cans, noncorrosive.

Speed Counters
0–9999.

Spring Balances
0–30 lb.

Starting Boxes
1. For compound motors, various makes.
2. For shunt wound, 1 h.p., 110-volt motors. Overload release.
3. For shunt wound, 1 h.p., 110-volt motors. No voltage release.
4. Starting devices of various makes and principles, for 1 h.p., 3-phase, 220-volt a.c. motors.

Storage Batteries
6 volt.

Switch
1. Battery, 4 point.
2. Bases, porcelain, for 10-amp. switches.
3. Boxes, 2¼ in. deep.
4. Entrance, safety, 2 pole, 30 amp., with 2-branch lighting circuits.

5. Entrance, safety, 3 pole, 30 amp., 250 volt.
6. Flush, push button, S.P., D.P., 3 way, 4 way.
7. Surface, S1, S3, and S4.
8. Knife, type A, D.P.S.T., D.P.D.T., S.P.S.T., and S.P.D.T.
9. Surface, snap, electrolier.
10. Surface, snap, S.P.D.P., 3 way, 4 way.

Switchboard
As required.

Tachometer

Tacks
Double-pointed No. 10.

Tape
1. Friction, ½-lb. rolls.
2. Rubber, ½-lb. rolls.

Telegraph Sets
Including sounders, keys, and relays.

Telephones
1. Complete bridging, independent phones.
2. Couch vestibule telephones.
3. Receivers, transmitters, induction coils, condensers, and bridging switch hooks.

Transformers
1. Bell ringing, 6, 8, 14 volt.
2. Single phase, 110–220 volt, 2K.V.A. porcelain, 9/16 by 3 in., 9/16 by 5 in., and 9/16 by 10 in.

Tubing
Flexible nonmetallic, ¼ and ⅜ in.

Washers
1. Iron, ¼ and ⅜ in.
2. Brass, ¼ and ⅜ in.

Wire
1. Annunciator, No. 18 or No. 20.
2. Fixture, No. 18, single yellow, with marker.
3. Rubber covered, solid copper, No. 10, black.
4. No. 10, white.
5. No. 14, black.
6. No. 14, white.
7. Rubber covered, No. 16, brewery cord.
8. No. 18, lamp cord, green and yellow.
9. S.C.C. copper magnet, enameled, sizes Nos. 16 to 26 inclusive.

Automotive

materials and supplies

Air Hose
25' length, ¼" I.D., 5 ply red, complete with ¼" pipe fittings and quick connect couplings.

Air Blow Gun

Batteries
1. 6 volt.
2. 12 volt.

Battery Bolts
9/16" x 1½" U.S.S. lead coated battery terminal bolts complete with nuts.

Battery Clips
1. "B" battery clips cadmium plated.
2. 50 ampere battery charging and test clips, lead coated.

Battery Compound
Battery sealing compound.

Binding Posts
Screw type.

Blades
1. Hand hack saw, 24 teeth per inch.
2. 10", 32 teeth per inch hand hack saw.

Brushes
1. 1½" flat.
2. 14" x 1⅛" steel wire, curved handle.
3. 6" diam. steel, wheel.
4. 8" bench or counter.

Bulbs, Light
1. 6 and 12 volt, sealed beam.
2. 6 and 12 volt, bayonet base.
3. Battery charger bulb (specify ampere capacity).

Cable
1. Extension cord, double conductor, molded rubber covered, 18 ga. heavy duty.
2. Primary, single conductor, stranded copper braid and lacquer covered, 14, 16, and 18 gauge.
3. Secondary, 7 millimeter, rubber.
4. Starter cable, No. 1 gauge rubber and woven cover insulation.
5. Starter cable, No. 6 gauge rubber and woven cover insulation.

Cable Terminals
1. Battery cable ground lugs for No. 1 starter cable.
2. Battery cable ground lugs for No. 6 starter cable.
3. Battery cable terminals, universal type or equal.
4. Clip type, high tension terminal for 7mm. cable.
5. Terminals, as-sos-11 solderless.
6. Terminals, 9/16" hole primary.
7. Terminals, 9/16" spade type primary.

Checks, Tool
Brass, 1" round.

Cleaning Compound
Oakite, Stoddart solvent or other material depending on the type of cleaning tank used.

Clips
Crocodile.

Cotter Pins
1. 1/16" x ¾", box of 1000.
2. 5/64" x 1", box of 1000.
3. 1/8" x 1½", box of 1000.

Drills
1. H.S.S., 1/16", jobbers, straight shank.
2. H.S.S., 1/32", jobbers, straight shank
3. H.S.S., 3/32", jobbers, straight shank.
4. H.S.S., 3/16", jobbers, straight shank.
5. H.S.S., 1/64", jobbers, straight shank.
6. H.S.S., 7/64", jobbers, straight shank.
7. H.S.S., ¼", jobbers, straight shank.
8. H.S.S., 17/64", jobbers, straight shank.
9. H.S.S., 5/16", jobbers, straight shank.
10. H.S.S., 21/64", jobbers, straight shank.
11. H.S.S., 25/64", jobbers, straight shank.
12. H.S.S., ⅜", jobbers, straight shank.
13. H.S.S., 29/64", jobbers, straight shank.
14. H.S.S., 31/64", jobbers, straight shank.
15. H.S.S., 7/16", jobbers, straight shank.
16. H.S.S., 33/64", jobbers, straight shank.
17. H.S.S., ½", jobbers, straight shank.

Emery Cloth
No. 2/0, 9" x 11".

File
1. 10" flat bastard (24 minimum).
2. 10" half round bastard (6 minimum).
3. 10" half round lead float (4 minimum).
4. 10" hand smooth (12 minimum).
5. File handle, large, medium, small(specify size), (24 minimum).

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Name.....
School.....
Street.....
City.....Zone....State.....

6. 10" mill smooth (12 minimum).
7. 10" round bastard (6 minimum).
8. Ignition point file (10 minimum).
9. Regulator point file, Delco-Remy model W-19.
10. 6" saw file, extra slim taper (4 minimum).
11. Warding, 6" smooth (4 minimum).

Fuses
Automobile SFE 4, 6, 10, 14, 20 amps.

Gasoline
Commercial grade (as needed).

Gauge (Thickness Gauge)
1. .002" thickness, ½" width, ground thickness gauge stock.
2. .003" thickness, ½" width, ground thickness gauge stock.
3. .005" thickness, ½" width, ground thickness gauge stock.
4. .010" thickness, ½" width, ground thickness gauge stock.
5. .015" thickness, ½" width, ground thickness gauge stock.

Greases
Chassis, purchase in quantity depending on amount used.

Grinding Compound
2 compartment oil mixed grades A & E.

Grinding Wheels
When requesting grinding wheels for replacement purposes, be sure to specify the material bond, grain, size, and hardness or grade.

Handle, Hammer
1. 14" length, 16 oz. machinist's.
2. 18" length, 24 oz. machinist's.

Hose
1. ¾", rubber, 2 ply, 50' lengths.
2. Radiator hoses are molded for specific cars.

Hose Clamps
Universal type, to fit 1" to 3" O.D. hose.

Hydraulic Brake Fluid

Hydrometer Floats
1. Automobile storage battery, hydrometer float only.
2. Automobile radiator hydrometer float only, calibrated for alcohol, glycerine, and prestone.

Insulator
1. Rubber to fit mueller No. 85 clips, red mueller No. 87.
2. Rubber to fit mueller No. 85 clips, black mueller No. 87.

Nuts, Machine Screw
1. No. 6-32, hex, steel.
2. No. 8-32, hex, steel.
3. No. 10-32, hex, steel.
4. No. 10-24, hex, steel.

Nuts
1. ¼"-20 hex, semifinished.
2. 9/16"-18 hex, semifinished.
3. ⅜"-16 hex, semifinished.
4. 7/16"-14 hex, semifinished.
5. ½"-13 hex, semifinished.
6. ¼"-28 hex, semifinished.
7. 9/16"-24 hex, semifinished.
8. ⅜"-24 hex, semifinished.
9. 7/16"-20 hex, semifinished.
10. ½"-20 hex, semifinished.

Nuts
1. ¼"-28 castellated hex, semifinished.
2. 9/16"-24 castellated hex, semifinished.
3. ⅜"-24 castellated hex, semifinished.
4. 7/16"-20 castellated hex, semifinished.
5. ½"- castellated hex, semifinished.

Oil
S.A.E. No. 20, engine oil (as needed).

Paint (for shop maintenance)
1. Black, quick drying enamel.
2. Red, quick drying enamel.
3. White, quick drying enamel.
4. Machine enamel, gray.

Pans
Automobile drain pans, approximately 3 gallon capacity, height not to exceed 5", galvanized.

Plugs
1. Attachment, molded soft rubber two prong, body only.
2. Attachment cap only.
3. Three prong for grounding.

Rags
Wiping, bleached and washed. (Some schools may prefer to use paper "kimwipes," or, wiping rags supplied and washed by a local laundry service).

Safety Glasses

Safety Washers (grinding wheel)
Order by pair, specify arbor size and diameter flange for grinding wheels.

Sal Ammoniac
For cleaning soldering coppers.

Sandpaper
1" width, No. 000, 50 yd, roll for commutators.

Screws, Machine
No. 6-32 x 1", round head.
No. 8-32 x 1½", round head.
No. 10-32 x 1½", round head.
No. 10-24 x 2", round head.

Screws, Cap
¼"-20 x ¾" to 1½", hex.
9/16"-18 x ¾" to 1½", hex.
⅜"-16 x 1¼", hex.
½"-13 x 2", hex.
¼"-28 x ¾", hex.
9/16"-24 x 1¼", hex.
⅜"-24 x 1½", hex.
7/16"-20 x 1¼", hex.
½"-20 x 2", hex.

Sealing Compound
Permatex.

Solder, Paste
All purpose, noncorrosive.

Solder Wire
No. 5 spools, ⅛" diameter, 50-50 alloy.

Spark Plugs
14 millimeter metric.

Staples
Insulated, ½".

Tape
1. ¾" friction tape.
2. ¾" rubber tape.

Tire Air Chuck

Tire Gauge

Tire Repair Kit
1. Tubeless repair kit.
2. Vulcanized patches.

Tire Repair Cement
½ pint can with brush in can.

Thermometers (Lab.)
Calibration 10° F.-220° F., 12" length, glass stem.

Tubing Fittings
Kit of assorted tube fittings consisting of:
¼" S.A.E., and inverted flare types.
¼" S.A.E., and inverted flare types.
9/16" S.A.E., and inverted flare types.

Tubing
1. ⅛" O.D. annealed copper, automotive.
2. ¼" O.D. annealed copper, automotive.
3. 9/16" O.D. flexible metal, galvanized steel.
4. 2" O.D. flexible galvanized tubing for exhaust lines.

Washers, Flat
1. ¼", 18 gauge thickness.
2. 9/16", 16 gauge thickness.
3. ⅜", 16 gauge thickness.
4. 7/16", 14 gauge thickness.
5. ½", 14 gauge thickness.

Washers, Lock
1. 5/16". 4. ⅜".
2. ¼". 5. 7/16".
3. 9/16". 6. ½".

Wire
1. No. 18 single strand copper, cotton covered (bell wire).
2. No. 24 single strand copper, single cotton and enamel covered.
3. Resistance wire, chromel No. 27, 3.25 ohms per ft.
4. Bonding wire, annealed iron, stove pipe No. 16.

small tools

Calipers
1. 6" — inside spring nut release, screw thread adjustment. High grade spring steel.
2. 6" — O.D. spring nut release, screw thread adjustment. High grade spring steel.

Carburetor Tool Kit
Complete set of overhaul tools for popular makes of carburetors.

Chisels
1. Cape ¼" — 6" length forged tool steel.
2. Cold ½" — 6" length forged tool steel.
3. Diamond point ¼" — 6" length forged tool steel.

Dies
(For economy purchase taps and die in sets).

Taps — Dies
1. Machine screw — 6-32, 6-40, 8-32, 8-36, 10-24, 10-32, 12-24, 12-28.
2. Set of taps and dies in national fine and national coarse threads, ¼", 5/16", ⅜", 7/16", ½", 9/16", ⅝", ¾", ⅞", and 1" sizes.
3. Set of tap wrenches and die stocks for above.

Dividers
6" stiff spring tapered spool, high quality spring steel legs with replaceable needlepoints.

Drill Stand
Fractional 1/16" to ½".

Drill, Electric
(*See* Special Equipment Section).

File Card
Steel back frame and face. Tempered steel wire bristles, complete with steel tapered pick.

Flaring Tool
3/16" to ⅜" O.D. tubing size.

Gauges
1. Shoe and drum gauge.
2. Tire gauge, standard tire pressure gauge, 0-60 lb. capacity.
3. Screw pitch gauge, 60°V type thread, 22 pitches, 32 to 74.
4. Thickness gauge, 2 9/16" length blade, 22 blades .004" to .025" tempered and encased.
5. Thickness gauge, 6" blade, 8 tapered leaves, .002, .003, .004, .006, .008, .010, .012, and .015 leaves.

Hammers
1. Machinist — 12 oz. ball peen, forged steel, heat treated and polished, wooden handle.
2. Machinist — 24 oz. ball peen, forged steel, heat treated, wooden handle.
3. Claw hammer, adze eye, curved claw, bell shaped head. Wooden handle, forged head.
4. Sledge — 7 lb. bell face, adze eye, forged hardened and tempered steel. Wooden handle.
5. Soft faced head, wooden handle.

Knife, Putty
1¼" wide 3½" long, tempered polished elastic steel.

Micrometers
1. Inside diameter — calibrated to .001", range 2"-9½", calibrated thimble with

ground steel extension rods. Angular grooved extensions for quick adjustment.
2. Outside diameter — drop forged "I" section frame. Anvil, spindle, and barrel high quality, ground steel. Standard calibrations. Size 0–1", 1–2", 2–3", 3–4" (4 sizes).

Oiler
5 oz., 3" spout, steel can, tempered steel bottom.

Oil Stone
4" x 1¾" x ½" medium, complete in wooden case.

Oil Measure
2 qt. heavy gauge galvanized steel combination measure, funnel and spout. All seams soldered.

Piston Ring Inserter Pliers

Pliers
1. 6" — slip joint.
2. 7" — long tapered long nose.
3. 8" — combination slip joint, forged tool steel.
4. 7" — diagonal cutter mechanic's pliers, forged heat treated high grade tool steel.

Punches
1. Drive pin, 8" knurled hardened steel, set of 8: 1/16" dia. to 5/16" dia.
2. Center, ¼" x 4", forged alloy steel hammer tested, knurled handle.

Rivet Set
Hand type for button head rivets.

Rule, Steel
1. 6" steel scale.
2. 12" x 1" width stainless steel, tempered, graduated in 1/8", 1/16", 1/32", 1/64".

Saw, Hand Hack
8" — 12" adjustable frame, 2¾" throat, pistol grip.

Screw Drivers
1. 3" plastic molded handle square shank, alloy steel.
2. 4" plastic molded handle square shank, alloy steel.
3. 6" plastic molded handle square shank, alloy steel.
4. 8" plastic molded handle square shank, alloy steel.
5. Offset at both ends, forged and tempered tool steel, set of 6 for 3/16" to ¾".
6. Phillips head screw driver, alloy steel tempered deep fluted blade. Set of 4 to fit points Nos. 1, 2, 3, and 4.
7. Clutch head screw driver, alloy steel tempered. Set of 4, Nos. 1, 2, 3, and 4.

Screw Extractor
Straight shank, deep fluted blade, hardened tool steel, set of six.

Scriber
1/8" dia. 10" double point hardened tool steel.

Snips, Tin
1. Straight — 3" drop-forged, hardened tool steel, straight blade ground and polished.
2. Curved — 3" drop-forged, hardened tool steel.

Soldering Iron, Electric
½" electric soldering copper, 200 watt complete with cord, tip and stand.

Square, Combination
Tempered 12" blade with forged square, center, protractor heads.

Stamps, Steel
1. 3/16" hand cut figures 1 to 0.
2. 3/16" hand cut letters A to Z.

Taps
(For economy purchase taps and dies in sets).
1. Machine screw taps — hand tap, plug type, straight fluted, high quality, carbon steel fine ground thread; 1-set: 6–32, 6–40, 8–32, 8–36, 10–24, 10–32, 12–24, 12–28.
2. N.C. Standard — hand tap plug type, national course standard thread, high quality carbon heat treated steel, 1-set: ¼"–20, 5/16"–18, 3/8"–16, 7/16"–14, ½"–13, 9/16"–12.
3. National fine standard, hand tap, plug type high quality carbon heat treated steel, 1-set: ¼"–28, 5/16"–24, 3/8"–24, 7/16"–20, ½"–20, 9/16"–18, 5/8"–18, ¾"–16.
4. National Standard Pipe, ⅛", ¼", ⅜".

Tap Wrench
1. T-handle, single handle, adjustable chuck, hardened jaws, made of quality steel.
2. Machine screw tap wrench, T-handle adjustable vise jaw, for holding machine screw tap size 6—32 to 12–28, quality steel.
3. National Standard tap wrench, adjustable vise jaw, for holding tap sizes ¼" to ¾", high quality steel.

Wrench, Adjustable
Single and adjustable jaw, forged steel, replaceable parts 6", 8", 10", 12".

Wrench, Monkey
10" length, 2" capacity, forged jaws and handle with nonmetallic fitted handle.

Wrench, Pipe
10" — length, ⅛" to 1" pipe capacity, forged and hardened tool steel.

Wrench, Spanner
Adjustable hook drop forged carbon steel hardened and finished smooth. Set of 3, capacity ¾" to 4¼" diameter.

It is recommended that only high quality alloy steel wrenches and sockets be purchased. Specifically, they should have lifetime guarantees so that cracked sockets and sprung wrenches can be replaced free of charge.

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ALBANY 5 NEW YORK

Wrenches, Box
Double broached hex, double offset drop forged chrome-moly alloy steel. Lifetime guarantee and replaceable. 4 to 8 sets: 4½" to 6" (short length), 9/16" and ¼" to ⅝", 5/16" and ⅜", ⅜" and 7/16", ½" to 19" (long length), ⅛" and 5/16", 5/16" and ⅜", 7/16" and ½", 9/16" and ⅝", ⅝" and 11/16", ¾" and ⅞", 15/16" and 1", 1 1/16" and 1⅛".

Wrenches, Electrical
Open end, double end, thin chrome-moly forged steel, chrome plated electrical set of 9: 13/64" to 7/16" openings.

Wrenches, Socket
½" square drive and/or ¾" square drive, thin wall, double broached, chrome alloy heat treated sockets. Chrome plated finish, 4 to 8 sets: 7/16", ½", 9/16", 5/8" extra thin for Ford V-8 85 h.p. connecting rods, 19/32", ⅝", 21/32", 11/16", ¾", 25/32", 13/16", ⅞", 15/16", 1". Deep sockets: 7/16" to 1", ½" and/or ¾" drive. Special spark plug sockets, 13/16" with rubber inserts.

Wrench, Handle
11" — ½" and/or ¾" square drive sliding "T" handle, alloy steel.

Wrench, Extension Drive
1. 3" — ½" and/or ¾" square drive extension, alloy steel, lock-in plug connector.
2. 10" — ½" and/or ¾" square drive extension, alloy steel.

Wrench, Ratchet (Reversible)
Ratchet gear, ½" and/or ¾" square drive, quick reversible.

Wrench, Drive Adapter
1. ¾" square female and ½" square male.
2. ¾" square male and ½" square female.

Wrench, Tappet Adjusting
1. 7/16" — ½" open end, thin alloy steel wrench.
2. ½" — 9/16" open end, thin alloy steel wrench.
3. 5/8" — 11/16" open end, thin alloy steel wrench.

Wrench, Universal Joint
¾" and/or ½" sq. drive.

testing and special

Air Compressor
1. 3 h.p., capacity, max. pressure 150 PSI, complete with steel tank, regulator, pressure unloader, safety valve and piping.
2. Air blow gun — forged brass, button valve type, 25 CFM at 100 PSI, specify hose size.
3. Air line chuck — ball foot type with serrated shank. Specify hose I.D.

Aligning Jigs
For connecting rods.

Arbor Press
25 ton hydraulic.

Battery Equipment
1. Batteries, storage — automobile 6 volt, 100 amp. hour capacity; 12V, 50 amp. hr.
2. Battery carrier.
3. Battery charger, tube rectifier type, 6 amp. capacity for 12 6-volt or 6 12-volt batteries.
4. Battery charger, fast charger selenium rectifier type with charging rate controlled by battery temperature or timer.
5. Battery hydrometer with built-in thermometer.
6. Battery syringe to water cells.
7. Battery voltmeter, high rate discharge O-3V, high capacity resistance unit, prong type.

Bench
1. Electric test — facilities for testing: generators, regulators and starting motors, 3 h.p. min. motor, variable speed drive for approximately 500–6000 r.p.m. tachometer, voltmeter, ammeter, shunts and resistors.
2. Work, with vises (4" vise).
3. Work, portable with vise.

Brake Equipment
1. Lining grinder with necessary adapters to grind and centralize car brake shoes.
2. Drum lathe with necessary attachments for both turning and grinding, including brake cylinder hones, lining clamps, and brake drum micrometer.
3. Reliner — combination riveter and grinder.
4. Lining bonder and remover (check electrical supply).
5. Brake bleeder.

Containers
1. Can, safety gasoline — 1 gal. 24 ga. lead coated, non-spill sealed. Trigger type pouring lip.
2. Can, waste — galvanized 12" x 15" can with legs and spring lift cover.

Chain Hoist
With overhead trolley and monorail, 3 ton capacity.

Cleaner
1. Steam — low pressure type (check local code).
2. Ring groove cleaner.

Cord Extension Light
Complete with molded rubber handle and socket. 20 feet super-service cable, molded rubber attachment plug and lamp guard.

Compass
Magnetic type needle.

Creepers
4 universal casters attached for easy movement.

Degreaser
With drum, filter and pump type circulated cleaning fluid.

Drill
1. Electric portable, ¼".
2. Electric portable, ½".
3. Press, 17", with motor and chuck.

Dynamometer
1. Chassis hydraulic absorption type.
2. Engine hydraulic absorption type.

Engine Lifting Equipment
Specify engine lift is to fit.

Engine Support Bars
Specify engine bars are to fit.

Fender Covers

Furnaces
Gas soldering.

Gauges
1. Cylinder gauge — dial indicator, universal type attachments complete in storage container.
2. Compression meter, dial face for use in spark-plug chamber.

Grease Dispensers
(Chassis pressure type).

Grinder
1. Cylinder, with motor and hone.
2. Electric bench grinder, 2 seven or eight-inch dia. wheels, complete with motor, switch, guards, tool rests and face shields.

Growler
110 V-60 cycle, for testing generator and starter armatures.

Honing Machine
Electric motor driven, for piston pins, king pins, etc., capacity to hone holes from ⅛" to 2½" inside diameter.

Hot Plate
Electric — 110 V-60 cycle.

Jacks
1. Floor roller, hydraulic type, 2 ton.
2. Hand stationary hydraulic type, 1½ ton.

Lathe
Metal bench type, 9" swing, back geared, motor driven.

Lifts
1. Automobile, hydraulic, twin post.
2. Automatic transmission, hydraulic lift.

Magnet
Permanent bar type ¼" x 1" x 6".

Meters
1. AVR 75 ampere D.C. 6, 12, and 24 volt scales d.c. complete with standard load resistor. Encased in durable portable case with heavy leads and clips attached.
2. Meter, ammeter — 30 amp. capacity, encased in shock proof case.
3. Meter, voltmeter — 20 volt rating.

Radiator Hydrometer
Calibated for alcohol, glycerine and ethylene glycol with built-in thermometer.

Spring Tension Scales
1. Brush and point spring tension scale 0-48 oz. spring type draw scale with hooked prong.
2. Steering gear checking scale 0-4 lbs. spring type draw scale with steering wheel grip.

Stands
1. Car stand (horse) — 2 ton min. cap.
2. Engine build up stand, supported to swing through 360°, mounted on casters with locking device.
3. Rear axle overhaul stand.

Testers
1. Coil tester to measure continuity, capacity, and resistance. Tester complete with coil heater and circuit interrupter — for hot and cold tests.
2. Condenser tester to measure continuity, resistance, and capacity of condensers.
3. Distributor tester, portable type complete for static and dynamic tests. For testing point resistance, dwell, mechanispark advance and vacuum advance.
4. Motor tester analyzer, facilities for testing battery, starting voltage and current, cylinder compression, intake vacuum, ignition coil, condenser. Complete with tachometer, dwell meter, volt-amp-resistance and combustion tester.
5. Power light tester. Synchroscope three lead type for making dynamic ign. timing.
6. Spark plug cleaner and tester.
7. Head light tester for adjusting headlight beam.
8. Thermometer tester. Fahrenheit scale glass tube mercury type. Scale 0° to 300° F.

Tire Service
1. Bead expander to compress crown of tire to force beads of tubeless tire against rim.
2. Tire changer with bead breaker and roller.
3. Tire gauge.
4. Tire tester (water tank).
5. Tire repair kit (Tubeless).

Valve Reconditioning Equipment
1. Valve refacer, electric. Motor driven grinding wheel. Universal motor driven valve stem chuck, mounted on adjustable feed base. 9/16" capacity, angle adjustment 30° to 90°, 110 V, 60 cycle motors, bench type.
2. Valve seat grinder, complete with stones for popular car sizes.
3. Valve spring compressor, adjustable for L head engines.
4. Valve spring compressor, adjustable for overhead valve engines.

Welding Unit

1. Portable oxyacetylene welding unit complete with 2 wheel carrier with cylinder holder device. Including: acetylene regulator, oxygen regulator. Torch complete with tips Nos. 0, 1, 2, 3, 4, 6, 8, 10 and cutting attachment. Oxygen and acetylene hoses of 4 ply molded rubber with clamps. Welding goggles, nonmetalic, molded to fit facial contour, eye cups ventilated, adjustable nose band, No. 6, 50mm. safety lens and 50mm. clear protective lens. Fire extinguisher, trigger type, foamite type. (All equip. must be approved by National Board of Underwriters' Lab.)

Wheel Alignment Equipment

1. Test rack with front pit preferred.
2. 3-way alignment gauge set for camber, king pin inclination and caster, including adapter sleeve and clamp to fasten on to spindle. Also turning radius plates.
3. Toe-in gauge.
4. Wheel balancer. Type capable of testing static and dynamic balance of wheel on car.

Brake Assembly

Front and rear.

Complete assembly including wheel, brake cylinder, linkage, and foot pedal for basic instructional unit on brakes. (Order mechanical hand, hydraulic, disc, etc., types which are used on current model cars.)

Carburetors

Current model carburetors used on popular model automobile engines.

Chassis, Automobile

1. Complete chassis with engine, starter, generator, regulator, and ignition system. All warning and electrical devices attached. (Basic instructional element for electrical work of all kinds.)
2. Chassis instructional element for front and rear suspension units, power transmission units including wheels and tires.

Differentials

Complete with carrier, axles, and power drive. Order Hotchkiss drive and torque tube types. For assembly and disassembly.

Distributors

Order distributors which are currently used on all popular automobile engines. Complete with distributor head, points, condenser, vacuum advance, automatic advance, and lube fitting (for use as basic training elements).

Engines

1. 6-cylinder overhead valve engine complete with clutch and transmission, ignition and fuel systems, in operating condition.
2. 6-cylinder in line, L head engine complete with clutch and transmission, ignition and fuel systems, in operating condition.
3. 8-cylinder V-type engine complete with clutch, transmission, fuel and ignition systems, in operating condition.
4. Any type cut away engine.
5. Used engines for assembly purposes. To be mounted for dead engine work.

Fuel Pumps

Order fuel pumps used on current engines. Vacuum, mechanical, magnetic, etc.

Generators

1. Order d.c. generators used on current model automotive engines complete with pulley and terminals, 6 and 12 volt types.
2. Order a.c. high output generator with d.c. rectifier and regulator (used on automotive two-way communication circuits).

Ignition Coils

Order coils used on current model automobile engines 6 and 12 volt-types (for basic training elements).

Ignition Condensers

Order condensers used on current model automobile engines (for basic training elements).

Regulators

Order 2 and 3 unit regulators complete with volt, current, and cutout coils. In good operating condition (for basic training element).

Starting Motors

Order starting motor types which are used on current model automobile engines. Order complete with starting switch (manual and automatic) and with engaging mechanisms (Bendix and overrunning clutch).

Steering Gear Assembly

Order steering gear assemblies used on current model automobiles, complete with shifting lever, wheel, arm, column, and shifting link arms (basic training element). Include power steering types.

Transmissions

1. Order conventional transmissions used on current model automobiles.
2. Order automatic type transmissions used on current model automobiles.

furniture

Benches

See section on Special Equipment and Testing Devices.

Bulletin Board

Cabinet

1. Steel supply, 36" x 18" x 72" cabinet, double doors, locking, 4 shelves.
2. First aid cabinet, 5" x 12" x 20" steel for first aid supplies, painted white.

Chalkboard

Desk, Teacher's

5 drawer.

Files

4 drawer, legal size.

Fire Extinguisher

Approved types according to local building and safety codes.

Seating

Provisions should be made for seating class: tablet arm seats are recommended.

Projector

1. 16mm. sound motion picture projector.
2. 35mm. comb. with 2" slide still-projector.

Screen

6' x 8' beaded screen, tripod or wall mtng.

Printing

equipment

Bellows

1. Hand, small size.
2. Electric, blower type.

Bookcase

For reference books, catalogs, etc., sectional preferable.

Brayer

6 or 8 in. for proofing.

Brushes

1. Bench.
2. Benzine, No. 1, oval black.
3. Floor.
4. Padding, 1½ in. wide.

Bulletin Board

Cabinets

1. Galley, for double column, wood or steel, four tiers (to be used with typesetting machines).
2. Galley, for 8¾ by 13 in. galleys, wood or steel, four tiers.
3. Ink and roller, to accommodate platen-press rollers, wood or steel.
4. Matrix, for use with typesetting machines only.
5. Roller, cabinet or rack for cylinder rollers.
6. Supply, for leads, slugs, spaces, strip materials, with top for lead cutter and mitering machine.
7. Type, school type, each to accommodate two California cases, job cases, case slides, galley slide, and copy holder.
8. Type, complete with 24 full-size California job cases, with overhead lead-and-slug cases, wood.
9. Type, complete with 24 full-size California job cases, double work bank, wood or steel.
10. Wood or metal, for filing class records, instruction sheets, etc.
11. Storage for cuts.

Cans

1. Benzine, pint size.
2. Benzine, 5-gal. size.
3. Kerosene, safety, 1-gal. size.
4. Waste can, fireproof, for rags.

Cases

1. Blank, full-size, to accommodate ¼-size cases.
2. Border, ¼-size, for ornamental borders.
3. Lead and slug, regular size, to hold laborsaving fonts of leads and slugs.
4. Metal furniture, to hold laborsaving fonts.
5. Rule, ¼-size, for brass rule.

Wood Furniture

Chairs

Teacher's and tablet arm.

Chalkboard

Permanent or portable.

Chase Racks

1. For platen presses.
2. For cylinder presses.

Chases

1. For each size of platen press.
2. For cylinder press.

Composing Sticks

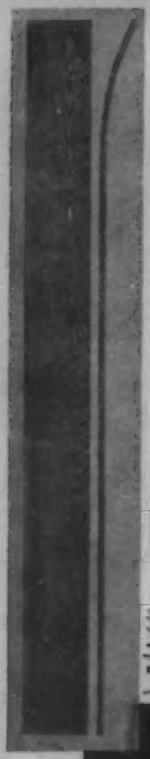
6 by 2 in., 8 by 2 in., 12 by 2 in., and 18 by 2 in., adjustable.

Cutter

1. Lead and rule.
2. Paper, lever type, 20 in., with pedestal. Should handle 20 by 26-in. sheet.
3. Paper, lever type, 26 or 30 in.
4. Paper, lever type, 30 in., with divided back gauge.
5. 30 in. to 36 in. power cutter.

Desk

1. Bindery, 80 by 36 in.
2. Drying rack.
3. Imposing, 51 by 39 in.
4. Make-ready, 32 by 24 in.
5. Paper cutters', 80 by 36 in.



NEW LEARNING UNIT

STUDENTS BUILD

WATER SKIS

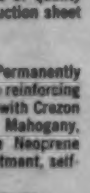
from quality S-4-S (bent only) stock— finest grade fittings supplied

Students start with rough pre-bent blanks shown here

Now any student can own the finest water skis and, at the same time, increase his woodworking skills. Ski blanks and fittings are supplied by one of the world's largest producers of quality water skis. Scale drawings and instruction sheet included.

SPECIFICATIONS:
Stock ⅝" thick x 7" wide x 6' long. Permanently bent at one end with hardwood spline reinforcing toe of ski. Choice of Marine Plywood with Crezon surface, Sitka Spruce, Philippine Mahogany, Solid White Ash. BINDINGS: White Neoprene rubber. Aluminum parts, single adjustment, self-locking heel plate.

SKI CRAFT CUSTOM WATER SKI FINISHES
This unit consists of one pint of Ski Craft Custom Sealer-Primer plus one pint of Clear Finish, or, for Crezon skis, one pint of Yellow Finish. These finishes are especially compounded to withstand the hard usage and moisture inherent in water skiing. Complete finishing instructions included.



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R. B. Wing and Son Corporation, Albany, New York
Youngblood Lumber Company, Minneapolis, Minnesota

Manufactured by
WESTERN WOOD MFG. CO.
Portland, Oregon

6. Proofreaders'.
7. Teacher's.

Drying Racks
1. Combination drying rack and stock table for platen presses, 30 trays.
2. Trays, interlocking, for cylinder press.

Folding Boxes
For hand folding.

Folding Machine
20 by 26-in. size, 4 fold, two parallel and two right-angle folds, power.

Furniture
Iron, 2 by 4 to 10 by 15 picas.

Galleys
Steel, 8¾ by 13 in., 6¼ by 23½ in., double column, and 12 by 18 in.

Gauge Pins
Spring tongue.

Glue Pot
Electric, 1-qt. size.

Imposing Tables
1. 12 by 18 in., with iron top, including regleta and furniture.
2. 24 by 36 in., with iron top, complete with galley slides, chase rack, regleta, and furniture.
3. 36 by 48 in., with iron top, complete with galley slides, chase rack, regleta, and furniture.
4. 39 by 63 in., with iron top, complete with drawers, letter boards, regleta, and furniture.

Ink Fountains
1. Short, for 8 by 12, 10 by 15, and 12 by 18 presses.
2. Long, for 10 by 15, and 12 by 18 presses.

Knives
1. Overlay, for make ready.
2. Ink, 6 and 8 in.
3. Ink, 8 in., square end.

Leader Boxes

Leaders
1. 6, 8, and 10 pt., fine dot.
2. 8 and 10 pt., hyphen.

Line Gauges
1. Metal, brass, or steel.
2. Wood.

Mallet

Metal Furnace
For recasting and refining type metal, used only with typesetting machines.

Mitering Machine

Numbering Machines
1. For use on presses.
2. Hand machines.

Ornaments
1. Assorted floral and decorative designs.
2. Border, 6 and 12 pt., decorative.

Paper-Drilling Machine

Perforator
1. 24-in., foot treadle.
2. 28-in., foot treadle.

Planer
1. Mallets, hickory or fiber.
2. Proof, maple, with felt bottom.
3. Type, maple with leather top.

Presses

Bookbinding
1. Cylinder, two revolution, four roller, 17 by 22, complete with variable-speed motor, cast rollers, etc.
2. Platen, 8 by 12, with foot treadle, counter, flywheel guard, platen guard, brake, and set of cast rollers (motor and treadle combination if desired).
3. Platen, 10 by 15, complete with variable-speed motor, counter, flywheel guard, brake, and set of cast rollers, etc.
4. Platen, 12 by 18, complete with variable-speed motor, counter, flywheel guard, platen guard, brake, and set of cast rollers, etc.
5. Proof, 14 by 18, with cabinet.
6. Proof, 20 by 24, with cabinet.
7. Proof, 23 by 24½, with cabinet.
8. Tableting.

Punch
1. Foot power, multiple with assorted punches.
2. Lever, two die, with assorted punches.
3. Power, multiple, with assorted punches (paper drill may be substituted).

Quoins
1. Sizes No. 1 and No. 2.
2. Keys, Sizes No. 1 and No. 2.

Rule
Plain and brass (fonts to fit quarter cases).
1. 2 pt., laborsaving, hair line, side face.
2. 2 pt. laborsaving, 1 pt. side face.
3. 1 pt., laborsaving, 1 pt. face.
4. 2 pt., laborsaving, double face.

Saw Trimmers
Pedestal type, with point gauge, and raising and lowering table.

Silk-Screen Unit

Spacing Material
1. Iron furniture, as selected.
2. Leads, laborsaving, 2 pt.
3. Leads, 2-ft. strips, 2 pt.
4. Slugs, laborsaving, 6 pt.
5. Slugs, 2-ft. strips, 6 pt.
6. Spaces and quads.
7. Thin spaces, brass and copper, assorted sizes, 6 to 8 pt., one size in each box.

Specimen Display Board

Staple Binder
Pedestal type, foot power.

Stereotyping Unit
8 by 12 in.

Stitcher
Wire, power, capacity ½ or ¾ in., flat- and saddle-back tables.

Tweezers
3½ in.

Tympan Paper
(With combination holder and cutter.)
1. 18 in.
2. 38 in., upright, to be used with cylinder press only.

Type
1. Body lightface — 8 and 10 pt.
2. Job lightface — 6, 8, 10, 12, 14, 18, 24, 30, 36, and 48 pt.
3. Job lightface italics — 8, 10, 12, 14, 18, 24, and 36 pt.
4. Job boldface — 6 and 8 pt., 12 pt., No. 26; 12 pt., No. 27; 12 pt., No. 28; 18 pt., No. 30.
5. Job, light copperplate Gothic — 6 pt., Nos. 1, 2, 3, 4; 12 pt., Nos. 5, 6, 7, 8.
6. Job condensed title Gothic — 12, 18, 24, 36, 48, 60, and 72 pt.
7. Job text type — 10, 12, 14, 18, and 24 pt.
8. Job, typewriter type — 12 pt. with spaces.
9. Job, boldface italic — 8, 10, 12, 14, 18, 24, 30, and 36 pt.
10. Job, heavy copperplate Gothic — 6 pt., Nos. 21, 22, 23, and 24; 12 pt., No. 25.
11. Wood, condensed Gothic — 8, 12, 15, and 18 line.
12. 10 pt. line leaders 4 dots to the em.
13. 10 pt. braces and dashes.
14. 10 pt. fractions.
15. 10 pt. references.
16. Parentheses and brackets.
17. 2 pt. laborsaving leads, 4 to 25 picas.
18. 6 pt. laborsaving slugs, 4 to 25 picas.
19. 2 pt. laborsaving brass rule.
20. 2 pt. miters for rule.
21. Laborsaving metal furniture.
22. Thin spaces and quarter-size case.

Typesetting Machines
1. Either linotype or intertype, 2 or 3 magazines, and molds.
2. Matrices for same, 6, 8, 10, and 12 pt., as selected.

Visual Aid Charts

supplies

Benzine, Gasoline, or Typewash
For cleaning type or presses.

Bindery Tape
2 in. wide, brown or black.

Gold Bronze
Pale.

Ink
1. Bond, black, for bond papers.
2. Book, black, for school papers, etc.
3. Cover, colors as selected.
4. Dryers and compounds, as selected.
5. Half tone, black.
6. Job, colors as selected.
7. Metallic, gold and silver.
8. Process, black, red, yellow, blue.

Kerosene
For cleaning rollers.

Padding Cement
1. Cold.
2. Hot.

Paper
1. Bond, fine grade, 17 by 22 — 20, white.
2. Bond, medium grade, 17 by 22 — 20, white.
3. Bond, sulphite, 17 by 22 — 20, white.
4. Bond, sulphite, 17 by 22 — 20, colors as selected.
5. Book, enamel, 25 by 38 — 80, white.
6. Book, machine finish, 25 by 38 — 80, white.
7. Book, eggshell finish, 25 by 38 — 60, white.
8. Cover, as selected, 20 by 26, medium.
9. Card Bristol, fine grade, 22 by 28 — 4 ply, white.
10. Index Bristol, medium grade, 25½ by 30½ — 110, white.
11. Index Bristol, medium grade, 25½ by 30½ — 140, white.
12. Mill Bristol, medium grade, 25½ by 30½ — 140, colors as selected.
13. Pressboard, red.
14. Strawboard, No. 40 or No. 50.
15. Tagboard, manila, 24 by 36 — 140.
16. Tympan, to fit presses.
17. Wrapping paper, size as selected.
18. Holder for same.

Paste
1. Bindery.
2. Make ready.

Silk-Screen Supplies
Consisting of:
1. Silk-screen process paste paint, 1 each of the following colors: toluidine red, strontian yellow, ultramarine blue, medium green, rich brown, orange, purple, white, and black.
2. Solvening liquid for knife-cut film.
3. 8-in. synthetic squeegee.
4. 11-in. synthetic squeegee.
5. No-clog varnish.
6. Film solvent.
7. Stencil filler.
8. Filler remover.
9. Stencil knife.
10. Fiber guides.
11. Red sable brush — ⅜ in.
12. Putty knife.
13. Frame tape.

Twine
Cotton, for tying jobs.

Wire Stitching
1. No. 28 round wire for stitcher.
2. Wire staples, ¼ in.

Ceramics

patternmaking

Modeling Materials
1. Semi-moist clay.
2. Synthetic modeling clay, e.g., Plasticene, Permoplast, etc.
3. Soft wood, e.g., basswood, sugar pine, etc.

Clay Modeling Tools
1. Boxwood.
2. Lace tool.
3. Sgraffito.
4. Wire loop.

Wood Modeling Tools
1. Wood carving chisels.
2. Files, assorted.
3. Rasps, assorted.
4. Surforms, assorted.
5. Woodturning lathe and chisels.
6. Saws, hand and power.

Shellac, Solvent, and Brushes

Wax
1. Liquid.
2. Paste.
3. Paraffin.

Wax Applicating Brushes and Rags

moldmaking

Adjustable Mold Boards
For variable sizes and shapes of molds, sheet metal faced.

Mold Board Base

Adjustable Clamps
1. C clamps.
2. Hand screws.
3. Spring clamps.

Plaster of Paris

Liquid Soap

Mixing Pails
1. Enameled.
2. Vinyl plastic.

Scale

casting

Casting Trimmers
1. Grit cloth.
2. Japan cleaning brush.

Clay
1. White modeling.
2. Flour.

Clay Mixing Machine
Agitator type washing machine.

Crocks
For storage of semi-moist clay.
1. 1 gal.
2. 5 gal.
3. Knife, pallet.
4. Lace tool.
5. Sponge, abrasive.
6. Sponge, cellulose.

METALCRAFTING
PROJECTS
Especially Suitable for VOCATIONAL EDUCATION

- ALUMINUM ETCHING
- STIPPLING
- COPPER TOOLING
- FOIL EMBOSSING

Looking for something new and different to offer your students this year? Introduce them to the art of metalcrafting.

With just a few simple directions even your most inexperienced students find it surprisingly easy to make beautiful trays, coasters, wall plaques, bracelets, and many other fascinating items.

The only basic materials needed are Craft Metals Corporation's sparkling Mirror-Finish Aluminum, or luxurious looking aluminum COLORCIRCLES . . . Craft Metals Corporation's Safe-T-Etch, non-acid etching compound . . . and Craft Metals Corporation's Hi-Temp Craft Black asphaltum paint.

CMC Aluminum Craft Circles are of the finest quality obtainable.

CMC Safe-T-Etch is the safer, faster etching compound which removes all of the objectionable features in acid etching.

CMC Hi-Temp Craft Black is the free-flowing, quick-drying, asphaltum paint that helps achieve cleaner, sharper etched lines in craft designs.

Craft Metals Corporation also has aluminum and copper embossing foils and tooling metals, and many other craft materials.

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7. Sponge, elephant ear.
8. Sponge, silk.
9. Steel wool.

Greenware Drying Cabinet or Shelves

Greenware Mender and Brushes

Hydrometer

Jars
For storing slip.

Plaster of Paris Molds
1. Animals.
2. Ash trays.
3. Book ends.
4. Candleholders.
5. Candy dishes.
6. Cigarette boxes.
7. Dishes.
8. Figurines.
9. Flowerpots.
10. Lamp bases.
11. Mugs.
12. Novelties.
13. Planters.
14. Salt and pepper shakers.
15. Trays.
16. Vases.
17. Others.

Plastic Bags
For storing greenware and semi-moist clay.

Slip Pitchers

Slip Strainers
50 mesh to 80 mesh.

firing

Kiln

Kiln Element Replacements

Electronic Temperature Controls

Kiln Patching Cement

Kiln Wash

Firing Accessories
1. Shelves: (*a*) Full; (*b*) Part.
2. Shelf posts, assorted lengths: (*a*) Round; (*b*) Square; (*c*) Triangular.
3. Stilts, ceramic or ceramic and wire (spur): (*a*) Single prong; (*b*) Three prong; (*c*) Four prong; (*d*) Bar.
4. Plate rack.
5. Tile setter.
6. Cones: (*a*) 08 to 04, standard or junior; (*b*) 020 to 018, standard or junior.
7. Cone setters: (*a*) Junior; (*b*) Standard.

Cooling Racks

Gloves

finishing

Brushes, Camel's Hair
1. Detail (round).
2. Glaze, ¾ in., ½ in., 1 in. (flat).

Glaze
1. Types: (*a*) Underglaze, assorted colors; (*b*) Detail, assorted colors; (*c*) Overglaze, assorted colors; (*d*) Transparent; (*e*) Clear; (*f*) Special.
2. Finish: (*a*) Matte; (*b*) Satin; (*c*) Gloss; (*d*) Crackle; (*e*) Speckle.

Jars, for storing glaze; 2 oz., 4 oz., 8 oz., pint, quart, and gallon.

Pitcher
Plastic, for pouring glaze.

Spray Equipment
1. Electric spray gun (with filters).
2. Hand insecticide spray gun.
3. Atomizer.

Vinyl Squeeze Bottle
2 oz., for brocade.

Drafting

for the room

Bench Brushes
One for each drawing table.

Blueprinting Frame or Reproducing Machine

Cabinets
Provided with drawers and shelves.
1. For storing drawings.
2. For storing models.
3. For storing rental instruments.
4. For storing tools and supplies.
5. For storing keys to student drawing table drawers.
6. For teachers wardrobe and books.

Chair
One, teacher's, adjustable height, office type.

Chalkboard and Tackboard

Chalkboard Tools
One each, compass, T square, straightedge, triangle and protractor.

Desk
One, teachers, with keyed drawers.

Drawing Boards
Six boards for each drawing table; softwood with end cleats; minimum size, 18 x 24 in. maximum size 20 x 26 in.

Drawing Tables
28, students', with storage space for six or more 20 x 26 in. drawing boards, and having six or more keyed storage drawers.

Pencil Sharpener
Two, mounted, of type that removes wood only.

Shears
10 in., for trimming drawings and prints.

Sink
Kitchen type with undivided basin.

Stools
28, wood seat, welded steel base, height to suit drawing tables; or, "clear floor" type with adjustable height seat mounted on a swinging bracket fastened to table leg.

T Squares
26 in., wood, with transparent edge lining; one for each drawing table plus six extra for replacement.

Utility Table
One, large, heavy top; for teacher's drawing board; for assembling and disassembling drawing projects, etc.

for the teacher

Beam Compass
One, with 7 in. bar.

Blueprint Paper
Fifty sheets cut to size and furnished in black lined envelope; or paper for reproducing machine.

Compass-Point Leads
One gross each, H and 2H, 1 in. long for student use.

Drawing Board
One, 22 x 30 in. with parallel straight edge attachment or with drafting machine.

Drawing Pencils
Three lead holder type with one package each of H, 2H, and 4H leads.

Ink
Six, ¾ oz. bottles black waterproof.

Ink Bottle Holders
Three, wood or metal.

Irregular Curves
Six, assorted sizes.

Lettering Pens
Speed Ball type, assorted sizes with round point.

Micrometers
1" and 2".

Oil Stone
One Arkansas, wedge shaped, 1½ x 1 in., for sharpening ruling pens.

Pencil-Lead Pointer
One True-Point type machine with supply of abrasive cones.

Proportional Dividers
One, 7 in.

Protractor
One, 6 in., semicircular, transparent.

Scale
One each, triangular, white face, architects and engineers.

Steel Stamps
One set with 5/16 in. high numerals; one set with 5/16 in. high letters.

Tape Line
One, 50 ft., steel.

Template
One, Isometric transparent, for representing circles to 2 in. diameter.

Tools for Measuring and Adjusting
One each, 12 in. machinists combination set; 6 in. outside caliper; 6 in. inside caliper; radius and fillet gauge; 5 in. flat nose pliers; 6 in. adjustable wrench; 2, 4, and 8 in. screwdrivers; 8 oz. machinists hammer.

Triangles
One each, 45 deg. 10 in., and 30-60 deg. 12 in.

for the student

Drawing Pencils
One each, 2H and 4H or as specified by the instructor.

Drawing Instruments
As specified by the instructor or as rented to the student by the school.

Drawing Paper
In quality, size and quantity as specified by the instructor.

Envelope
One, large size, for storing paper and finished drawings.

Eraser
One pencil, firm texture.

Erasing Shield
One small size, metal.

Irregular Curve
One, about 7 in. as selected by the instructor.

Pencil Pointer
One pad of abrasive sheets.

Protractor
One, printed metal, about 4 in. semicircular.

Scale
One, 12 in., triangular hardwood, with architects graduations.

Thumbtacks or Drafting Tape
One small box or small roll.

Triangles
One each, 45 deg. 10 in., and 30-60 deg. 12 in.

the second section of part VI of —

The Automated Industrial Revolution

THOMAS A. HIPPAKA

Now that our civilization is constantly perfecting the system known as "automation," human beings no longer need to be slaves to monotonous drudgery. Day by day, automation is relieving men's muscles of the heretofore heavy burdens. Automatic measurement, as well as control, are literally assuming many of the functions of men's sense organs and brains. More specifically, measurement includes inspection, while automatic control assumes certain supervisory functions. As time marches on, more complicated components are being assembled automatically, necessitating changes in manufactur-

Dr. Hippaka is professor of industrial education at Iowa State College at Ames.

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It is encouraging to note that various experts are in substantial agreement that no prolonged social upheavals need result from the total process of automation.

Frank G. Woollard has given us such assurance in these words:

> Automation is not a device with which to outlaw, displace or dispense with man. . . . It is a means for increasing man's stature and extending his ability to produce in greater volume with less physical effort or mental strain.

From the standpoint of human well being, certain generalizations might be made regarding automation. As machines replaced the muscles of men during our so-called First Industrial Revolution, it can be said that automatic controls are replacing men's brains in the present revolution.

In the long run, automation benefits most workers. Naturally, there are certain immediate, and serious dislocations for those who must make drastic vocational adjustments. Due to automation, there are those who may never recover from the loss of a job such as they enjoyed in a conventional factory, because they cannot make the necessary adjustments.

Since it is generally conceded that automation can continue to have beneficial effects upon our economy, American standards of living will continue to improve. Improved automation means increased production in a very competitive world which makes the United States a better competitor in the global markets. With other nations constantly accelerating their production, it behooves us continuously to improve our own, if we are to remain in the vanguard of the world's industrial production and good living.

Social Adjustment and Automation

Social stresses are bound to accrue as automation becomes more widespread in the world. Industrial revolution has always been characterized by stresses and strains upon humanity. Not only will the worker continue to have his difficulties, but management will be compelled to wrestle with new problems, as well as the old ones, made more complicated by the inescapable acceleration in automation. To a very considerable extent, the severity of these stresses and strains will depend upon the extent and the speed with which automation continues to take place. Americans have never been found wanting in absorbing the shocks of industrial revolution. They will not fail in the years ahead; they will continue to cope successfully with the phenomena now called "automation."

Mental ill health is constantly on the increase in the United States. The more pessimistic experts estimate that one in ten of our people are inflicted with poor mental health in one form or another.

To say that automation will bring prolonged mental and physical suffering is erroneous. The history of industrial advancement proves conclusively that the lot of humanity has generally been bettered, even when industrial advancement has been highly accelerated. It cannot be denied that certain workers were compelled to suffer certain unpleasant consequences under such circumstances. On the other hand, most of them have made the necessary adjustments, and have usually recovered the ground suddenly lost when machinery replaced them, or when a new industrial process made their services unnecessary.

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Fortunately, from the standpoint of social implications, automation, as a process in many instances is developing more in the way of an evolution than a revolution. Certain important factors account for this

(Continued on page 126)

SOFT VINYL COVER GOGGLES

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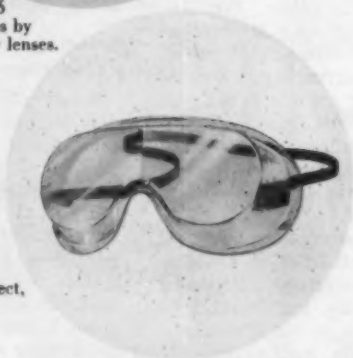

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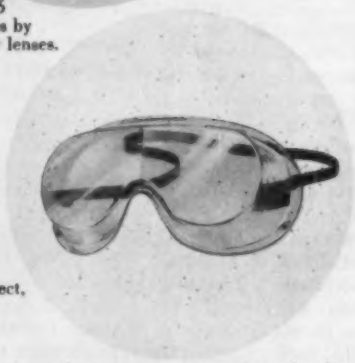

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AUTOMATION

(Continued from page 124)

condition. Capital costs will continue to be excessive. Conventional industrial plants, in many instances, cannot be adapted to automatized operations. New buildings will have to be constructed which will always take time, money, and effort. Costly equipment, especially designed, will have to be installed in these newly conceived buildings. The dearth of electronic control equipment, difficult to build in the first place, has delayed the development of automation as a process. Then, too, there will always be areas in industry not too readily adaptable to automation. Changes will come quite gradually, all of which will give the country more time to wrestle with the social and economic implications, as well as the ever-present problems of a continuous industrial movement.

The lack of adequately prepared personnel will constitute a continuing problem, as far as technological developments in connection with automation are concerned. The shortage of qualified workers will tend to delay progress in the field of automation, thereby moderating the intensity of any social repercussions. Many high school and college students capable of the mastery of subjects which eventually lead to success in our modern industrial world have not always been willing to subject themselves to such disciplines. Preparation in communications skills, mathematics and the sciences must start in high school. Opportunities in our industrial economy are numerous and lucrative for people who can and will become scientists, technologists, skilled technicians, specialists in electronics, or experts in the area of automatic control.

Nations will always explore and utilize the potentialities of automation. Increased population, improved standards of living, maintenance of respectable status in world markets, sustenance of life itself, constitute primary incentives for improving methods and devices in production. It is conceivable that a continued high birth rate throughout the world may make automation imperative, if humanity is to enjoy reasonable high living standards. History will record that through accelerated production we led the world in military might, and through such strength we preserved the peace. Above all, it will be recorded that leadership in peacetime production, as well as the production of military weapons, was in the hands of the American people who pursued peace and not ruthless conquest.

Vocational Improvement of the Individual Necessary

Over the years, improvements in machines and productive methods in many civilized countries have steadily improved man's living conditions, as well as his employment status. By the same token, automation will further enrich the lives of human beings as time marches on. Workers will have to make continuous adjustments, for many jobs will cease to exist, while new ones will be created by the ever-evolving process known as automation. In ever increasing numbers, people will have to possess the versatility not only to prepare for new jobs, but to alter their mode of living from time to time.

Continuous vocational preparation will of necessity become an imperative activity. Employees can never cease to improve themselves, if they expect to remain employed. The carry-over from a job that once existed for the employee may approach zero. There will be times when transfer of learning ceases to exist. Occasions will arise when the worker will be compelled to learn an entirely new job, older methods and skills having been made useless by newer developments. There will be a greater demand, all along the line, as far as mental and technical skills are concerned. It naturally follows that the greater the knowledge and skill required of the worker, the greater should be his remuneration.

Assisting the Employee to Adjust Himself

Labor and industry will have to develop even greater confidence in each other. Workmen, no doubt, will be displaced from time to time, as new machines are invented. On the other hand, a great majority of these workers will prepare themselves for new jobs. More skilled men will be needed to design and to make automatic devices, as well as to maintain them. Labor unions will have to upgrade their membership, while industry will have to do its share to help sustain mass purchasing power. Automation will naturally bring labor shifts, and the employee will need the help which only the labor-industry co-operation can provide, if he is to make the necessary adjustments.

Automatized industry offers other gains to the worker beside his financial rewards, important as they are. Conveyors in ever-increasing numbers relieve the worker of physical and mental strains, which were present in the traditional factory. Jobs have become more interesting; they are safer; they prove more pleasant with each new development. The

worker is really challenged, for his job requires more intelligence. Monotonous and laborious manual tasks have become a thing of the past in the production of many commodities.

While it is true that automatic devices are replacing men, they are also performing tasks that workers cannot do in the first place. Consequently, a new machine does not always displace men. There are times when they create jobs which had not existed heretofore. Automative controls are now used in places where it is too dangerous for a man to go, or the place may not only be too dangerous, but it may be too small for a man to enter. Of course, there are always cases where a machine can perform a task more efficiently than the worker. The machine can act faster and more effectively than a human being, making it possible to check every piece instead of testing a random sampling. All of this change leads to the improvement of the product. Human fatigue is reduced to a minimum where automatic devices do the work with superior economy, precision, efficiency and consequent reliability. Automatic temperature controls, as well as boiler pressure controls, greatly reduce fuel consumption. Automatic control of fluids in chemical plants makes less storage space necessary, thereby reducing time lags and increasing the speed of operation in the plant. The automatic computer will continue to relieve various routine workers.

There can be no denying that someone is bound to suffer, as civilization marches on. On the other hand, active, healthy-minded individuals generally recover through self-discipline and self-improvement, thereby increasing their strength in the labor market. They may even prove the point that labor can retain its rightful share of the national income by working shorter hours with greater concentration and interest in the job.

The complexity of some of our machines has reached the stage where man himself has become the chief barrier beyond which machine designers cannot go. So serious has this problem become that human engineers appear on the payrolls of many equipment manufacturers. Their primary task is to determine the compatibility of men and machines even before the new designs leave the drawing boards.

Much of industry's automatic machinery is so made that the human hand or brain never becomes the sole factor in their entire operation. Ever-increasing numbers of automatic devices now do the work of industry, with such power, speed, dexterity, accuracy and steadiness that the human mind and muscles are completely out of the picture once the machine is in operation.

Where the prolonged presence of the human being is deemed essential in the operation of a machine, he literally becomes a part of the machine. Frequently the man's capacities become more of a problem than those of the machine. In the final analysis we either create a machine which does not need the human attendant after a certain time or we make a machine that can utilize human capabilities, taking into account human frailties, limitations and possibilities for errors.

The so-called First Industrial Revolution produced a factory system of production where the sizable industry was directed by managers hired by a board of directors. The ensuing industrial system utilized the services of everyone, from the mentally retarded to the genuis. For many years industry had employment opportunities for the unskilled, the semi-skilled, the skilled as well as the people who possessed supervisory, managerial, foremanship or administrative ability. Even the individuals

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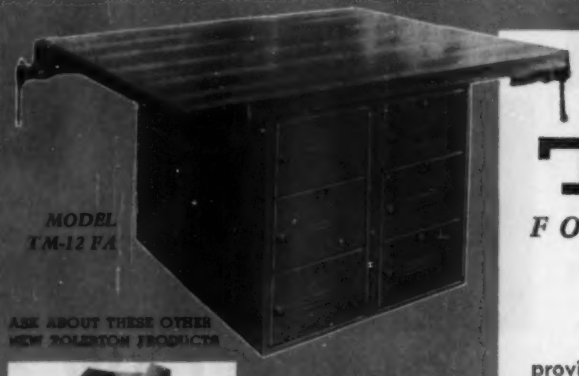

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> One board tells him what each piece of machinery in his bank is doing. The other one tells him when a cutting tool needs sharpening, and stops the machines. When this happens the board also tells him what other tools are getting dull and ought to be changed as long as the machine is stopped.
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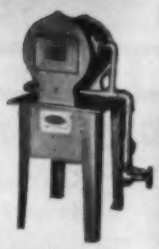

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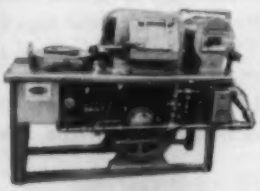
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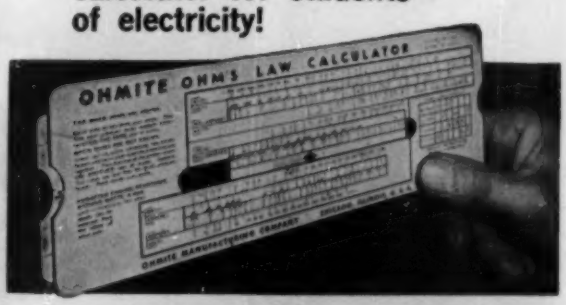

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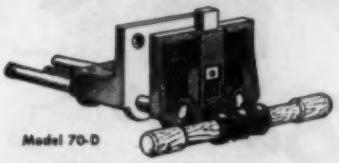
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[1]Lavone Hanna, Gladys L. Potter, and Neva Hagaman, *Unit Teaching in the Elementary School* (New York: Rinehardt and Co., 1955), p. 393.

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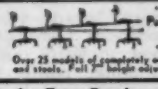
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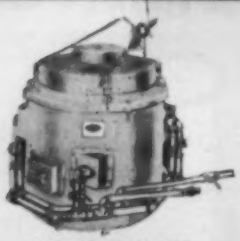
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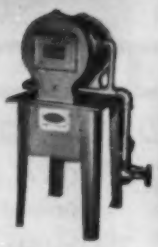

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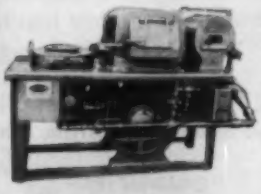
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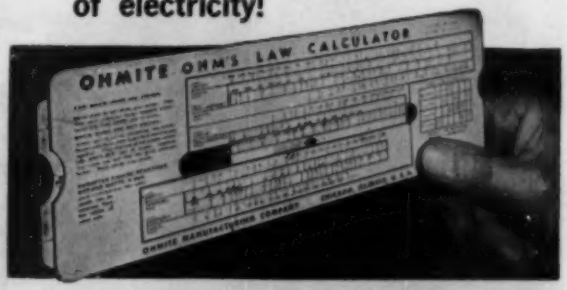

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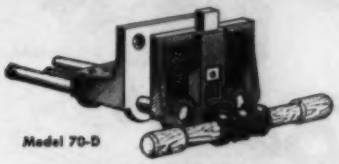
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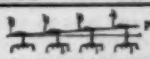
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The content of the unit is usually developed around an area rather than a specific problem or topic. An analysis of the area in the form of topics or questions which the children might ask is helpful in showing the scope of the unit. Most resource units have enough content for several units of work.[2]

The activities section of the resource unit is the heart of the resource unit. Here are found suggestions in terms of activities for introducing the unit, for gathering information, and for presenting data and ideas. In this section are also located the suggestions for terminating the unit and drawing together the experiences so the children might see the value of what they have been doing. The activities should be checked against the objectives to see if they are contributing to the development of desirable characteristics described in the objectives.[3]

The resource unit, unlike the teaching unit, contains a section on evaluation. There should be suggested ways of evaluating what has been done. Techniques useful for evaluation of growth might be standardized tests, anecdotal records, class observation, sociograms, check lists, autobiographies, etc.[4]

The final section of the resource unit should contain a bibliography. The bibliography should be organized into a pupil bibliography and a teacher bibliography, and audio-visual and environmental materials should also be set forth in each.[5]

In order to understand the resource unit better and its close relationship to the unit of work, it might be well to first discuss the teaching unit. The teaching unit is a specific lesson plan which contains detailed plans on what the student and teacher will do. The unit might be long or short, depending on the subject areas with which it deals, or it might depend upon the desired outcomes of the unit. Wesley[6] states that a unit of work is an organization of experiences around a problem related to the interests of the children. The purpose of the unit is to effect a change in the student's behavior, understanding, attitudes, and interests. The result of the unit is not measured primarily in terms of information, but in terms of skills, understanding generalizations, processes, insights, principles, and other results which have been transferred.

[2] *Ibid.*, p. 399.
[3] *Ibid.*, p. 401.
[4] Hanna, *loc. cit.*
[5] *Ibid.*, p. 402.
[6] Edgar Wesley, *Teaching Social Studies in Elementary Schools* (Boston: D. C. Heath and Co., 1946), p. 165.

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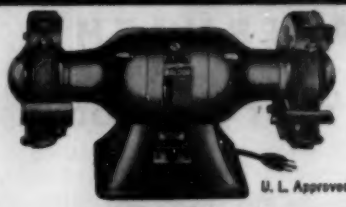

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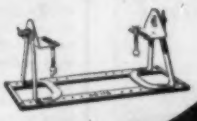

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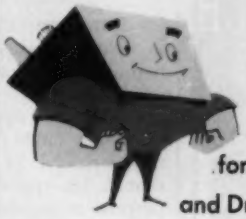

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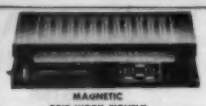

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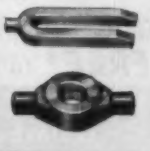

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RESOURCE UNIT

(Concluded from page 130)

Of course, selection of the unit well in advance of the meeting of the class permits the teacher to acquire the information and background necessary which he must have in order to effectively guide the class. The activities included in the teaching unit should be varied and brief. Their purpose is to stimulate interest, suggest ways of collecting and reporting information, and provide for individual differences in ability and interests.[7]

The resource unit differs from the teaching unit in several ways. The resource unit has the following characteristics:

1. It is written for the teacher for his use in planning with the children.
2. It is organized for quick and easy use.
3. The resource unit contains a wealth of material and suggests a good many activities from which the teacher can make selections. No one teacher is expected to use all of the suggestions.
4. The resource unit is written with no particular group of children in mind. It may be written for a wide age span.[8]

The resource unit will be of much greater value to the teacher if he can prepare it himself, but frequently it is more profitable in terms of time, if he works with other teachers. Many times the resource unit is developed by a committee which results in a pooling of ideas.

The resource unit is the backbone of the teaching unit and should be carefully prepared to insure successful and adequate treatment of the unit. Work shops, committees, meetings, and conventions, are but a few means of exchanging, comparing and pooling ideas for the construction of a resource unit.

There are many schools which teach the academic subjects successfully by the unit method of teaching, so, therefore, there seems to be no reason why the industrial-arts courses cannot be presented in a like manner. With the use of the resource unit, many industrial-arts instructors will be able to broaden their present course offerings, thus creating a more challenging and effective teaching-learning situation.

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Wesley, Edgar, *Teaching Social Studies in Elementary Schools* (Boston: D. C. Heath and Company, 1946).

[7]James Quillen and Lavone A. Hanna, *Education for Social Competence* (Chicago: Scott Foresman and Co., 1948), p. 192.
[8]Hanna, *op. cit.*, p. 394.

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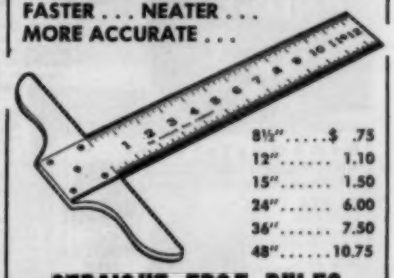

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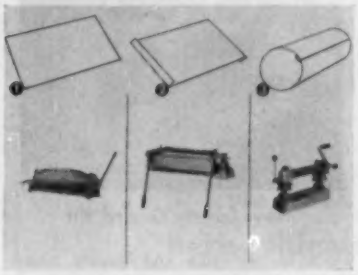
FROM DIES TO "DIE-LESS DUPLICATING" — A MIDWESTERN STORY

"Die-Less" metal-forming machines, developed by the O'Neil-Irwin Manufacturing Company, eliminate costly dies. These Di-Acro machines are naturally reusable and the original cost is low so that they quickly pay for themselves on a cost-per-piece-formed basis.



Combination of three Di-Acro machines — Shear, Brake, and Roller

The O'Neil-Irwin Manufacturing Company first became recognized for its Die-Less duplicating procedures in the late thirties and very early forties. Beginning as a tool and die operation, the factory was soon engaged in manufacturing a line of hand-operated Di-Acro metal-forming machines that developed great demand.

In those early days, there were only three machines: a 6-in. Di-Acro-shear that could cut any material from "wet tissue paper to 22-gauge steel plate"; a 6-in. Di-Acro brake that could form any angle in material up to 16-gauge steel plate; and a Di-Acro Bender that could make any bend in rods, tubes, channels, and other forms of stock. Adjustable stops allowed duplication to die accuracy.

To handle more forming operations the company added more machines . . . rollers, brakes, notchers, rod parters. Capacities were increased to 36-in. and 48-in. widths for machines that handled sheet materials.

To meet the ever present demand for faster production, automatic and semi-automatic gauging was added to all machines where it was practical. Settings were arranged to be made from the front wherever possible. Power packages were developed with foot controls that freed both of the operator's hands for feeding materials.

Ever broadening its line of metal-forming machines, the O'Neil-Irwin Manufacturing Company entered into the manufacture of machines using dies. They introduced Di-Acro press brakes, punch press, and turret punch presses. From hand-operated models, these machines were adapted to power use culminating in a unique press-brake achievement — a rotary hydraulic-cylinder-driven model with a dual-speed stroke and a stroke length that can be adjusted in 15 seconds. A full line of dies is also manufactured.

Versatility, as always, is still the keystone of all Di-Acro machines and the O'Neil-Irwin Manufacturing Company itself. A recent development demonstrating this is a spring winder that sets up for different sizes in less than a minute. And latest of all developments is a versatile "Rol-Form" die for press brakes and punch presses that forms any angle to 60 deg. with one 60-deg. male punch.

Further information to be had by writing.

(For further details encircle index code 0301)

BLACK & DECKER NEW 18-GAUGE SHEAR

A hand-held electric shear that weighs only 6½ lb. but will slice its way through 30 ft. per minute of No. 18-gauge cold-rolled steel is now available in the Black & Decker Manufacturing Company's line of power tools.

Identified as the No. 18 Shear — from its rated gauge capacity in steel — the new tool is designed to deliver 2500 cutting strokes per minute under full load.

Like other shears in the Black & Decker line, the No. 18 requires only slight forward pressure and can follow pattern lines perfectly, with the cutting blade visible at all times. Also, like the others, it is equipped with the B. & D. shear motor with spiral bevel gears, ball bearings, forged connecting rod, centrifugal fan, and heavy-duty switch.

Rated and identified by its cutting capacity in cold-rolled steel, the new shear will handle monel metal or stainless steel in thicknesses up to 20 gauge.

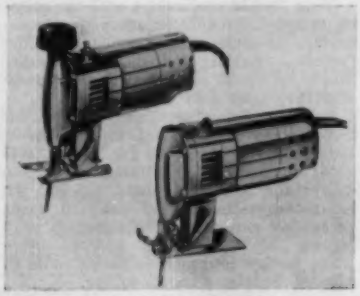
No. 697 No. 18 Shear is available for immediate delivery.

(For further details encircle index code 0302)

TWO NEW FAST-CUTTING JIG SAWS ANNOUNCED BY MILLERS FALLS

Two new power jig saws are the most recent additions to the broad line of portable electric tools made by Millers Falls Company. Both incorporate Millers Falls' *patented* "angle-blade" design that improves chip clearance and greatly increases cutting speed.

The No. 560 is a deluxe model and offers many features of special interest to homeowners, hobbyists, and professional craftsmen. Its unique, two-way reversible shoe permits cutting to within less than an inch of walls, stair risers, etc. A rotatable blade locks in any 90-deg. position and facilitates close-quarters cutting. The powerful, cool-running motor has a long-wearing, ball-bearing armature. The cord is a full 7 ft. and of 3-conductor design for safety. The nonslip plastic knob is specially serrated for a surer, more comfortable grip and has a "loss-proof" blade-changing hex key permanently inserted in its base. The No. 560 is furnished complete with eight blades — four for cutting wood and four for metal.



Two new Millers Falls Jig Saws

The No. 360 is a powerful, quality-built tool with self-lubricating bronze bearings; 6 ft., 2-conductor cord; and it is supplied complete with two blades — one for cutting wood and one for metal.

Both models have full polish, die-cast aluminum housings. They saw straight lines, curves, and irregular shapes in hard and soft woods, metals, plastics, and composition materials at 3000 ½-in. strokes per minute. Capacities are 1¾ in. in wood and ⅛ in. in metal, and switches are in a new, easy-to-reach location.

Exceptionally lightweight, these new saws are convenient to use in any position, even overhead. They cut their own starting holes in wood, and a continuous air blast keeps the cutting line free of sawdust and chips. Motors are of Universal design with 2.5 amp. rating at 115 volts; 230-volt models are available without additional cost.

An inexpensive, heavy-gauge steel table is offered. This converts either saw to a fixed bench unit for lighter, more exacting projects. Table top measures 8 by 8 in., and table may be bolted to bench for extra stability.

(For further details encircle index code 0303)

NEW KNIGHT HI-FI EQUIPMENT CABINET AND MATCHING SPEAKER ENCLOSURE

Allied Radio Corporation announce their new deluxe Knight Equipment Cabinet and matching Speaker Enclosure designed to transform any hi-fi music system into a striking customized installation. These units have handsomely styled genuine furniture veneers in choice of mahogany, limed oak, or walnut. Both units are available either as kits or fully assembled.

Knight Equipment Cabinet and Speaker Enclosure

The white-enamel interior of the equipment cabinet, Model KN-1500, is divided into three compartments. The top compartment is 8 in. high, 34 in. wide, and 16⅛ in. deep — more than enough room for any amplifier and tuner combination. Included is a finished panel for custom mounting of components. Bottom compartments are each 16 in. high, 15¼ in. wide, and 16⅛ in. deep — large enough for any record changer or turntable and most tape decks. Either bottom compartment is large enough to store a generous record collection.

The speaker enclosure, Model KN-1275, accommodates speakers up to 15 in., as well as most two- and three-way systems. An adapter board in the enclosure may be left in place for infinite baffle operation or adjusted for tunable ducted-port bass re-

(Continued on next page)

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SHOP EQUIPMENT NEWS

(Continued from previous page)

flex use. The vibration-proof ¾-in. hardwood panels are finished identical to the equipment cabinet. Smart boucle-weave grille cloth and gold-finish trim highlight its impressive design.

The equipment cabinet pre-finished kit is Stock No. 70 DZ 412C; only a screw driver is required for assembly.

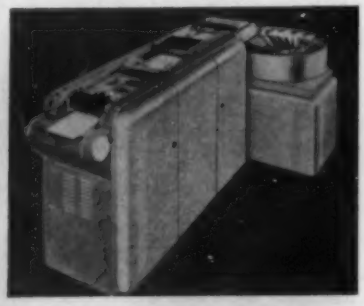
The factory assembled model is 70 DZ 409C, the speaker enclosure kit is 70 DZ 406C, and the assembled enclosure is 70 DZ 403C.

Information on prices may be obtained upon request.

(For further details encircle index code 0304)

COPYFLEX MODEL 60 TEAMS WITH COLLATOR TO SPEED WORK

Charles Bruning Company, Inc., have introduced an automatic, high-speed copying machine, which can be teamed with an ingenious collator that assembles copied materials in their correct sequence.



Copyflex Model 60

The diazo copying machine, Copyflex Model 60, was designed for high volume production of letter-size copies. It smoothly integrates printing, cutting, and stacked delivery of any desired number of copies in one continuous mechanical operation.

Copyflex Model 60 is easy to operate. An operator has only to set the speed and counter dials for automatic printing, cutting, and stacking. After the required numbers have been copied, the original is ejected and the next original automatically inserted for any pre-set quantity of copies.

High volume reproduction of one or more originals can be automatically obtained at the flick of a switch and the turn of a dial. The Copyflex Model 60 will print up to 1500 copies per hour.

When used in conjunction with the copying machine, the collator automatically assembles the copies as they emerge from the Copyflex, enabling the operator to distribute up to 20 copy sheets immediately after they have been made.

A "step and stop" rotation collector drum is electrically synchronized with the drive system on the Model 60 for project collating of copies at all printing speeds.

Like the Model 60 diazo printer, the collator operates on 230 volt, 60 cycle, alternating current. It is finished in gray enamel.

For further information, please write to Charles Bruning Company, Inc.

(For further details encircle index code 0305)

NEW SAFETY KIT FOR RADIAL-ARM POWER TOOLS

DeWalt Division of American Machine and Foundry Company, originator of radial-arm power tools for home, farm, school, and industry, have introduced a safety kit consisting of two guards — one for straight grinding, buffing, and wire wheels up to 6-in. diameter, and one for cup wheels up to 4-inch diameter.

The new safety guards can be used in a variety of grinding and buffing operations

New Safety Guard Kit

which are so easily and quickly accomplished on the radial-arm machine by simply removing the saw blade from the arbor shaft and attaching the desired wheel. The guards fit over the wheel, and are clamped to the motor end bell by using the motor stud and wing nut.

Adjustment, to assure placement at the safest angle of use, is made by loosening three screws on the guard bracket.

A complete kit consists of one guard bracket, two guard shrouds, one tool rest assembly, and necessary hardware, and is available through all franchised AMF DeWalt dealers.

The new guards will supplement the function of the standard guard, and offer the home craftsman and professional user increased safety in radial-arm power tool accessories.

(For further details encircle index code 0306)

NEW VERSATILE VACUUM CLEANER

Black & Decker Manufacturing Company have announced a new high-styled, heavy-duty vacuum cleaner, with versatility that makes it the equivalent of four ordinary cleaners.

Designated as the No. 25 Heavy-Duty Vacuum Cleaner, the new unit offers the means for more efficient cleaning in many commercial, automotive, and industrial uses.

As a conventional vacuum cleaner, for use in motels, hotels, schools, hospitals, stores, and office buildings, the No. 25 can be placed flat on the floor and moved easily on metal runners, or can stand vertically on sound-absorbing rubber feet.

The basic unit includes a wall mounting bracket and a hose hanger. It can be equipped with a combination of accessories as desired for any particular use.

By utilizing the bracket, the unit becomes a fixed-in-place vacuum cleaner, but can easily be lifted off the bracket if mobility is desired.

(Continued on page 136)

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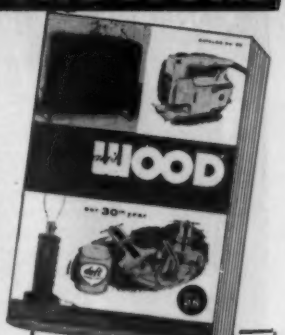

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SHOP EQUIPMENT NEWS

(Continued from page 134)

An adaptation of the wall bracket makes it possible to suspend the unit from a pole or column, this being particularly convenient for quick cleaning of an automobile interior while the car is parked for other services at a filling station or other automotive establishment.

The most unusual feature of the new cleaner is its adaptability for use as a "Back-Vac." A pair of straps permits the operator to don it like a pack and move into such confined spaces as stockroom aisles.

The No. 25 Vacuum Cleaner is designed to permit use of a disposable paper bag inside the regular cloth bag with which the cleaner is equipped. The entire top of the cleaner can be lifted off for removing or cleaning the bags.

Additional information to be had by writing.

(For further details encircle index code 0307)

The Recordak Presstape Splicer

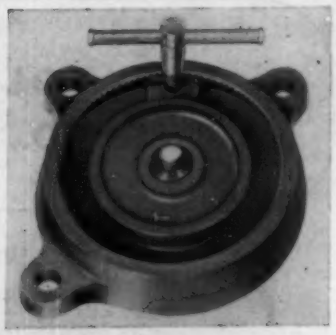
RECORDAK ANNOUNCES NEW MICROFILM SPLICER

A new, inexpensive, easy-to-operate Presstape splicer, especially designed for use with 16mm. microfilm has just been announced by Recordak Corporation, a subsidiary of Eastman Kodak Company.

Featuring a unique application of clear tape, the new unit is expected to provide customers with a virtually foolproof method of revising, repairing, or consolidating their microfilm records. The tape used to join the splice is packaged so that the operator does not touch the face of the film to complete the operation.

In announcing the new product, Van B. Phillips, vice-president of sales and advertising, pointed out that microfilm has become an integral part of many business systems, and that the new splicing unit will provide even greater flexibility to the use of microfilm in business and industry.

(For further details encircle index code 0308)



A New Swivel Base Kit

A NEW SWIVEL BASE KIT

The Columbian Vise & Mfg. Company have announced their new swivel base kit which converts Columbian stationary base machinists' vises to swivel base types.

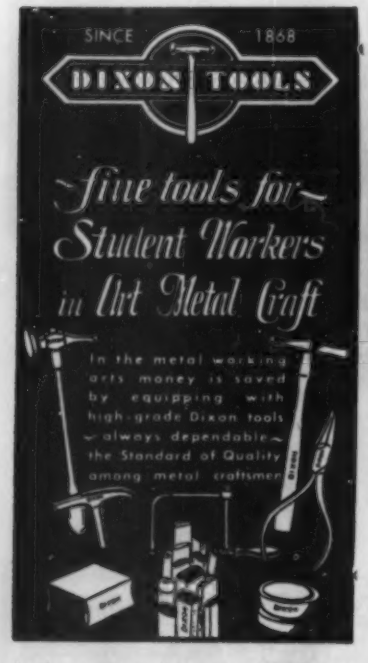
Adaptable to all 1960 stationary model vises of 3-, 3½-, 4-, 4½-, and 5-in. jaw widths, the kit can be installed in two minutes. It consists of swivel base, lock nut, lock bolt, center bolt, washer, bushing, and plug cap. Kit weights range from 5 lb., for 3-in. vises to 11 lb., for 5-in. vises.

For details, write The Columbian Vise & Mfg. Company. Ask for Bulletin L-1143A.

(For further details encircle index code 0309)

TYPE 2200 THERMOLYNE HOT PLATES

A new series of hot plates featuring a newly-designed thermostatic control unit that provides close, stepless control of temperature from 10 deg. above ambient to 700 deg. F., is announced by Thermo Electric Mfg. Company. Type 2200 Hot Plate consists of four models in two sizes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—12 by 12 in., and 12 by 24 in., each for either 115-v., or 230-v. operation.

The sturdy construction of these hot plates combines sleek styling with design features aimed at focusing heat on the

reacting thermostat, yet keeping the case and the rest of the interior cool for protection of hands, table tops, and the other circuit components. Perforated control housing, heat-reflecting baffles, air spaces, and ample insulation below the heating section achieve this purpose.

The cast-aluminum top plate is ribbed to minimize any tendency toward warpage. Heavy gauge aluminum and perforated stainless steel are used in the case construction. Nickel chromium elements are embedded in new high-purity refractory plates that are separate from the top plate and can easily be replaced by the user if need be.

The bi-metallic thermostat incorporates an Alnico permanent magnet that materially lengthens contact life by aiding in a sure and swift "make and break" of the contacts and by effectively "blowing out" any arc that may form. Temperature stabilizes quickly and initial overshoot is negligible. The thermostat holds any temperature in the hot plate's range within plus or minus 5 deg. F., regardless of wide fluctuation in line voltage or ambient temperature.

Please write for further information on numerous fine features of Type 2200 Thermolyne Hot Plates.

(For further details encircle index code 0310)

BESELER VU-GRAPH HELPS GROWTH OF EDUCATIONAL TELEVISION

The Beseler Vu-Graph Overhead Projector is contributing a major part in the development of television as an educational medium. Enterprising television stations, such as WMVS-TV a noncommercial, edu-

The Beseler Vu-Graph Overhead Projector

(Continued on next page)

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MONEY BACK GUARANTEE

KASENIT CO. (EST. 1912) 16 KING ST. MAHWAH, N. J.

SHOP EQUIPMENT NEWS

(Continued from previous page)

cational station, depend largely on the Beseler Vu-Graph for versatile performance on their low-budget shows. It has the featured role on their current series called "Your Living Room is the Classroom," in which adult education courses in various subjects are offered. By means of the Vu-Graph, the instructor visually demonstrates his lecture with either prepared material or illustrations sketched right on the spot, while telecasting.

The station also uses the Vu-Graph as a rear projection device. The projector has been adapted to handle a length roll of transparent acetate, on which is drawn scenery, story characters, and other graphics for production onto a 9 by 12 screen.

New and unique methods of utilizing the Vu-Graph are constantly being discovered, as more educators and speakers employ this equipment to meet their individual needs.

For information on how the Beseler Vu-Graph Overhead Projector is being used as a vital educational tool, write to Charles Beseler Company.

(For further details encircle index code 0311)

NEW DISTRIBUTOR TESTING MACHINE

Snap-on Tools Corporation have made available their new Distributor Testing Machine, believed to provide quick check-out, accuracy, and easier distributor servicing and parts replacement. This new machine checks contact point cam angle or dwell for each cam lobe, shows up wear in distributor shaft and bushing, checks centrifugal governor advance against factory specifications, checks vacuum spark advance, shows up wear in breaker plate and housing, shows up wear in cam, shows contact point bounce and shows point creepage.

New Distributor Testing Machine

The most unique feature of this machine is that the distributor vise is mounted off to the side, away from the screen to provide complete visibility of the 360-deg. scale. Exclusive double light system connects to distributor primary which causes bands of light to appear on dial. Length of light bands, measured in degrees on the dial, is believed to be the exact dwell period or cam angle for each lobe of the cam. This is believed to be 100 per cent accurate as dwell readings are the result of actual physical contact of the ignition distributor contact points. Red and blue lights in the system are operated at 180 deg., to each other for easiest comparison. When the lights are connected separately to both sets of points on dual distributors, individual dwell and overlap are said to be clearly shown.

Heavy duty vacuum pump, producing 26 inches of vacuum, can also be used to check vacuum brake components and carburetor power valves. Two-scale tachometer is said to switch automatically to proper scale — high or low — as revolutions increase or decrease. Red and green signal lights indicate which scale is in operation. Up to 4000 r.p.m., for the distributor or 8000 r.p.m., actual engine speed may be achieved.

More detailed information is available upon request from the manufacturer.

(For further details encircle index code 0312)

BRETT "FUL-VU" SHEARGUARD

Brett-Guard Corporation have announced the development of an important new safety advance — full protection with visibility for the dangerous metal cutting shears. Their new Brett "Ful-Vu" Shearguard safety guard made with visual Plexiglas is the result of more than 18 months

Brett-Guard "Ful-Vu" Shearguard

of safety engineering research on the shears, long considered one of the most dangerous machines in the metalworking shop.

Up to now, guarding metal shears has been a safety problem because existing guards are made of metal and are not transparent. The metal guard obstructed the view of the cutting blade, and also the mark on the metal to be cut.

With the adjustable Brett "Ful-Vu" Shearguard the cutting blade is visible at all times through the ¾-in. thick Plexiglas shield. In addition, the mark on the metal to be cut is clearly shown through the Plexiglas shield and fingers cannot contact the cutting blade.

The new Shearguard is adjustable for all metal thicknesses used in shear operations; it also permits cutting any length or width up to the listed nominal cutting length safely with full visibility. It is constructed of clear Plexiglas ¾ in. thick by 4 in. wide, extending across the entire front of the shearing knife. The guard is fastened to the two (2) side blade housings at each end of shear frame, and located in such a position as to be ⅜ in., above top of shear table. Bottom edge of guard is recessed where necessary to clear table guides.

Further information available.

(For further details encircle index code 0313)

(Continued on page 140)

--BRADLEY UNIVERSITY

Announces the 1960 Summer Session

Comprehensive courses are offered in Industrial Arts and Technical Education at both undergraduate and graduate levels during each of two terms.

Balanced Professional and Shop Courses

A wide variety of courses are offered in the following areas:

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ARTS AND CRAFTS	WOOD

Six semester hours credit may be earned in each of the five-week sessions.

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Second Term, July 18—August 20

For additional information write Director of Summer Session, Bradley University, Peoria, Illinois

THE PENNSYLVANIA STATE UNIVERSITY
Department of INDUSTRIAL EDUCATION

1960 SUMMER SESSION

Inter-Session	June 13 to July 1
Mid Session	July 5 to August 12
Post Session	August 15 to September 2
First Six Weeks Session	June 13 to July 22
Second Six Weeks Session	July 25 to Sept. 2

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University Park, Pennsylvania

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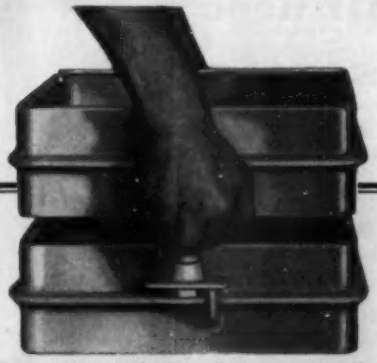

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(For more information from advertisers, use the postcard on page 155)

SHOP EQUIPMENT NEWS

(Continued from page 138)

NEW "SURFORM" TOOL

Stanley Tools, division of The Stanley Works, have introduced another in the family of "Surform" miracle speed-forming tools.

The new round file-type (No. 297) "Surform" tool, with a 5/8-inch diameter,

Round File-Type "Surform" Tool

enlarges holes in wood, aluminum, plastics, plywood, asphalt tile, etc., and cuts the same materials with controlled ease on decorative work. The round blade is replaceable. It has hardened cutting teeth which will not clog because the shavings

clear through a hole at each tooth. It quickly cuts rounded edges — concave half circles on the edges of boards or beams (for recessing rods or pipes) — and elongated cuts such as the forming of a curved "hand" slot on a solid chair back. Inserted in a bored hole, the round file-type "Surform" will rapidly remove material to a finish line.

For further information write to educational department, Stanley Tools, division of The Stanley Works.

(For further details encircle index code 0314)

EICO FURNITURE CABINETS

Electronic Instrument Company, Inc., are offering a unique solution to the problem of hi-fi decor. They have designed fine wood furniture cabinets that slip right over the metal cabinets housing its stereophonic and monophonic high fidelity components.

EICO furniture cabinets add the rich, warm beauty of fine furniture woods to make the high fidelity components attractive, integrated accessories for living room, den, or recreation room. Available in un-

EICO Furniture Cabinet WE 70

finished birch, or walnut and mahogany, these new furniture cabinets fit any decorating scheme.

For further information and prices on the WE70 Furniture Cabinet (for EICO's HF85 Stereo Dual Preamplifier, HF65 Preamplifier, HF12 Integrated Amplifier, HFT-90 FM Tuner, HFT92 FM/AM Tuner) in unfinished birch, or in walnut or mahogany; and the WE71 Furniture Cabinet (for EICO's HF81 Stereo Dual Amplifier-Preamplifier, and HF32 Integrated Amplifier) in unfinished birch, and in walnut or mahogany, write to the manufacturer.

(For further details encircle index code 0315)

(Continued on page 142)

THE FRIENDLY STATE FOR
1960 SUMMER SESSION
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TECHNICAL COURSES:
All usual courses in Woodworking, Metal Working, Drafting and Design, plus advanced work in Metal Spinning, Recreational Handicrafts, Basic Electricity, Lapidary.

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For IA majors—Project Design Seminars; School Shop Planning; Professional workshops in Plastics, Project Analysis, Visual Aids, Tests and Measurements, General Shop Problems.

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Include guidance and counseling, audio-visual education, school administration and all related areas. Graduate or undergraduate work under competent resident and visiting instructors, amid scenic wonders—national parks, Pacific beaches, mountains, trout streams, lakes—in a genuinely stimulating climate. A summer you will enjoy!

The student may plan a program which, through successive summers at this widely recognized school, will lead to a bachelor's or master's degree. Approved programs carrying the recommendations of Oregon State College are accepted by all state departments of education for either a Special or a General Secondary Credential.

Note: Please write direct to school.

Correspondence invited. Write directly to:
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Department X., Corvallis, Oregon
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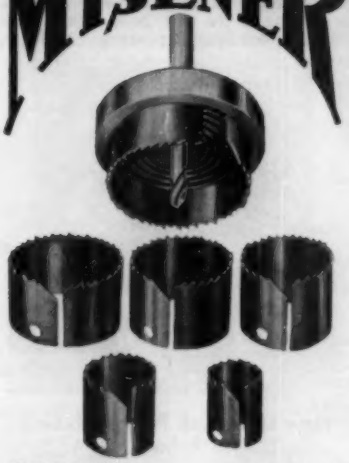
MISENER HOLE SAWS



Illustrated is a MISENER "HOLE-MASTER"

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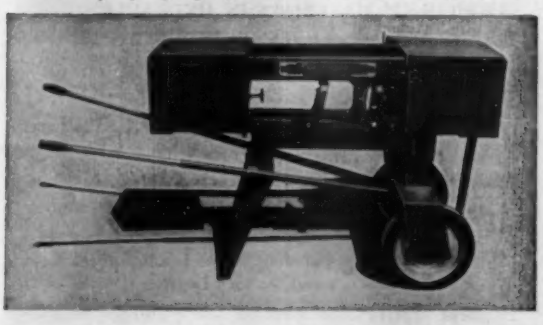

Here's the popular Kalamazoo Model 610 metal-cutting band saw on the handiest chassis you ever saw. Provides greatly increased portability with its rubber-tired 12-inch wheels and telescoping handles. One man shifts the 610 from job to job with ease. Capacity 6" Rounds — 10" Flat.

610-D without coolant attachment.
610-W with coolant attachment.
Kalamobile chassis M6A fits all 610 models.

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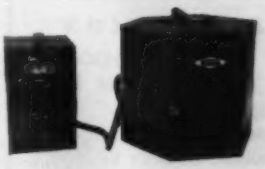

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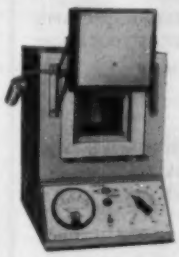

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Write for literature and name of nearest dealer

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SHOP EQUIPMENT NEWS

(Continued from page 140)

NEW MODEL PROOF PRESS

The Challenge Machinery Company has announced their new combination hand cylinder and proofing press for graphic arts shops. This new EZ Model has the added advantage that it can also be used as a hand cylinder press for instruction in presswork or for running short-run jobs.

EZ Model Proof Press

This model offers a means of reducing equipment costs, and saving valuable shop space by providing press that can be for both instruction and proofing.

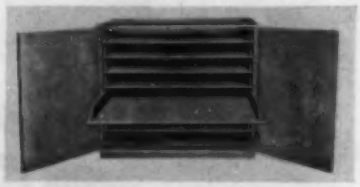
Its features include a cylinder with adjustable packing, cylinder grippers, an impression trip, and a feed board. A galley height bed is provided and a galley plate so that the job can be run either directly from type or in galleys. Forms up to 13½ by 18 in., can be handled.

For more information write the Challenge Machinery Company.

(For further details encircle index code 0316)

BLUEPRINT AND PAPER STORAGE UNIT

The Tolerton Company announces an economical and practical blueprint and paper storage unit with eight spacious pull-out shelves. Tray size inside 24¾ by 36½ by 3 in. The unit is constructed of maple



New storage unit for blueprints and paper

plywood without top or with maple or Nevamar plastic top. Toe space 3 by 3 in., is also provided.

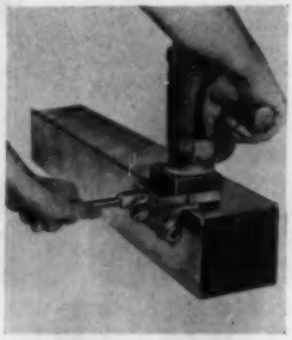
Over-all size of the unit is 35 in., high by 41¼ in., wide by 27½ in. deep. Shipped fully assembled. Approximate weight 225 lb.

Further information available from The Tolerton Company.

(For further details encircle index code 0317)

NEW LECTRO-LOK PITTSBURGH LOCK ROLLER

The slow, ear-splitting method of hammering ductwork seams closed may soon be a thing of the past. Now Millers Falls Company has applied power to this noisy,



New Lectro-Lok Pittsburgh Lock Roller

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(Continued on page 144)

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Directory of Manufacturers' Products

This directory is published as a convenient guide to sources of supply, covering the products of manufacturers carrying product information in this ANNUAL NUMBER. For alphabetical index of manufacturers' advertising see page 155. To obtain products not included in this directory, quotations or additional information to help you make up your specifications, lists of equipment, etc., address Industrial-Arts Service Division, or use coupon on page 156.

A

ADJUSTABLE CHAIRS & STOOLS
Toledo Metal Furniture Co.

ADJUSTABLE CURVE RULERS
Alvin & Company
Brodhead-Garrett Co.
Dietzgen Co., Eugene
Fairgate Rule Co.
Modern School Supplies
Post Company, Frederick
Weber Co., F.

AIR FILTERS
Logan Engineering Co.

ALUMINUM PROJECTS
Craft Metal Corporation
Donjer Products
St. Louis Crafts, Inc.

AMMETERS
Brodhead-Garrett Co.
Electronic Instrument Co. (EICO)
Precision Apparatus Co., Inc.

ANGLE PLATES
Challenge Machinery Co.

ANVIL BASE
Dixon, Inc., Wm.
Saxcrafts
Stoner Wood Products Co.

ANVILS
Brodhead-Garrett Co.
Dixon, Inc., William
Milwaukee Tool & Equip. Co., Inc.
Patterson Bros.
Saxcrafts

ANVIL TOOLS
Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.
Stanley Tools

ARBOR PRESSES
Brodhead-Garrett Co.
Dake Engine Company
Dixon, Inc., Wm.
Patterson Bros.

ARC-WELDING SETS & EQUIP.
Brodhead-Garrett Co.
Delta Mfg. Co.
Marquette Mfg. Co.
Trindl Products, Inc.

ART METAL TOOLS
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Dick Blick Co.
Dixon, Inc., William
Patterson Bros.
Saxcrafts

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Duro Metal Products Co.
K-D Manufacturing Co.
Lufkin Rule Co.
Snap-on Tools Corp.
Starrett Co., The L. S.
Williams Co., J. H.

AWLS, TINNERS
Brodhead-Garrett Co.
Patterson Bros.
Peck, Stow & Wilcox Co.

B

BABBITT FURNACES
American Gas Furnace Co.
Brodhead-Garrett Co.
Hones, Inc., Charles A.
Patterson Bros.

BAND SAW BLADES
Boice-Crane Co.
Delta Mfg. Co.
Duro Metal Products Co.
Oliver Machinery Co.
Patterson Bros.
Rouse & Co., H. B.
Starrett Co., The L. S.
Upholstery Supply Co.
Walker-Turner Co., Inc.

BAND SAW BRAZERS, Electric
Boice-Crane Co.
Foley Mfg. Corp.
Oliver Machinery Co.
Walker-Turner Div.

BAND SAWS
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
Northfield Foundry & Machine Co.
Oliver Machinery Co.
Parks Woodworking Mach. Co.
Patterson Bros.
Rouse & Co., H. B.
Walker-Turner Co., Inc.
Yates-American Machine Co.

BAND SAWS, METALCUTTING
Boice-Crane Co.
Brodhead-Garrett Co.
Duro Metal Products Co.
Kalamazoo Tank & Silo Co.
Oliver Machinery Co.
Patterson Bros.
Rouse & Co., H. B.
Walker-Turner Div.

BAND SAWS, PORTABLE
Brodhead-Garrett Co.
Delta Mfg. Co.
Patterson Bros.
Porter-Cable Machine Co.
Walker-Turner Co., Inc.

BAND SAW SETS
Brodhead-Garrett Co.
Oliver Machinery Co.

BENCH FURNACES
American Gas Furnace Co.
Brodhead-Garrett Co.
Dixon, Inc., William
Hones, Inc., Charles A.
Johnson Gas Appliance Co.
Patterson Bros.
Thermo Electric Mfg. Co.

BENCH-PLATES
Challenge Machinery Co.
Dixon, Inc., William
Patterson Bros.
Peck, Stow & Wilcox Co.

BENCH TOPS
Hardwood Corp. of America
Patterson Bros.
Sheldon Equip. Co., E. H.

BENCHES
Jewelers' and Metal Workers'
Brodhead-Garrett Co.
Craftools, Inc.
Dixon, Inc., William
Parent Metal Products, Inc.
Patterson Bros.
Saxcrafts
Sheldon Equip. Co., E. H.

BENCHES, MANUAL TRAINING
Brodhead-Garrett Co.
Challenge Machinery Co.
Engineering Mfg. Co.
Hamilton Manufacturing Co.
Parent Metal Products, Inc.
Patterson Bros.
Sheldon Equip. Co., E. H.
South Bend Lathe Works
Standard Pressed Steel Co.
Tolerton Co.

BENCHES — WORK
Challenge Machinery Co.
Dixon, Inc., Wm.
Patterson Bros.
Sheldon Equip. Co., E. H.
Standard Pressed Steel Co.
Stoner Wood Products Co.
Tolerton Co.

BENCH VISES
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Columbian Vise & Mfg. Co.
Dixon, Inc., William
Milwaukee Tool & Equip. Co., Inc.
Morgan Vise Co.
Parent Metal Products, Inc.
Patterson Bros.
Saxcrafts
Sheldon Equip. Co., E. H.
Stanley Tools
Tolerton Co.
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Hossfeld Mfg. Co.
O'Neil-Irwin Mfg. Co.
Patterson Bros.
Peck, Stow & Wilcox Co.

BINDERY EQUIPMENT & SUPPLIES
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Challenge Machinery Co.

BIT HOLDERS, EXTENSION
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Patterson Bros.
Stanley Tools

BITS, Auger, Machine, Hollow Chisel, Router
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Chicago-Latrobe
Irwin Auger Bit Co.
Patterson Bros.
Porter-Cable Machine Co.
Skil Corp.
Stanley Tools
Upholstery Supply Co.
Walker-Turner Div.
Williams Co., J. H.

BITS, SCREW DRIVERS
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Irwin Auger Bit Co.
Patterson Bros.
Snap-on Tools Corporation
Stanley Electric Tool Div.
Stanley Tools
Upholstery Supply Co.

BLACKBOARD DRAWING SETS
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Brodhead-Garrett Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
Weber Co., F.

BLACKSMITH TOOLS AND SUPPLIES
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Columbian Vise & Mfg. Co.
Patterson Bros.
Stanley Tools

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Brodhead-Garrett Co.
Patterson Bros.

BLOWPIPES, Brazing, Jewelers'
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Brodhead-Garrett Co.
Dixon, Inc., William
Hones, Inc., Charles A.
Patterson Bros.
Saxcrafts

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Post Company, Frederick

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Bruning Co., Inc., Charles
Dick Blick Co.
Dietzgen Co., Eugene
Fairgate Rule Co.
Garrett Tubular Products, Inc.
Hamilton Mfg. Co.
Modern School Supplies
Post Company, Frederick
Saxcrafts
Stacor Equipment Co.
Tolerton Co.
Weber Co., F.

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Southern Screw Co.
Upholstery Supply Co.

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Higgins Ink Co., Inc.

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Oliver Machinery Co.
Patterson Bros.
Skil Corp.
Yates-American Machine Co.

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South Bend Lathe Works
William & Co., J. H.

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Brodhead-Garrett Co.
DeWalt Products Co.
Patterson Bros.
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Williams & Co., J. H.

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Brodhead-Garrett Co.
Dick Blick Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
School Products Co.
V & E Mfg. Company
Weber Co., F.

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Patterson Bros.
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Upholstery Supply Co.

BRAD AWLS
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Stueck, Inc., W. Whitney

BRASS FURNACES, GAS
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Brodhead-Garrett Co.
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Western Materials Co.

BRAYERS
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Dixon, Inc., William
Saxcrafts

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Hones, Inc., Charles A.
Patterson Bros.
Trindl Products, Inc.

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Dick Blick Co.
Post Company, Frederick
Saxcrafts
Weber Co., F.

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Brodhead-Garrett Co.
Dick Blick Co.
Dietzgen Co., Eugene
Modern School Supplies
Saxcrafts
School Products Co.
Weber Co., F.

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Craftools, Inc.
Dixon, Inc., William
Knudson, E. C.
Saxcrafts

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Baldor Electric Co.
Brodhead-Garrett Co.
Craftools, Inc.
Delta Mfg. Co.
Dixon, Inc., William
Patterson Bros.
Walker-Turner Div.

C

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Standard Pressed Steel Co.
Upholstery Supply Co.

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Tolerton Co.

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Lufkin Rule Co.
Millers Falls Co.
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Patterson Bros.
Starrett Co., L. S.
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Craftools, Inc.
Patterson Bros.
Saxcrafts

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DeWalt Products Co.
LeBlond Machine Tool Co.
Patterson Bros.
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Donjer Products
Electric Hotpack Co., Inc.
Saxcrafts
School Products Co.
Seeley's Ceramic Studio
Tolerton Co.

CHARTS
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Starrett Co., The L. S.

CHASING TOOLS
Brodhead-Garrett Co.
Dixon, Inc., William
Saxcrafts

CHISELS, Cape, Cold, Grooving
Brodhead-Garrett Co.
Cincinnati Tool Co.
Delta Mfg. Co.
Duro Metal Products Co.
Patterson Bros.
Peck, Stow & Wilcox Co.
Snap-on Tools Corp.
Stanley Tools
Williams Co., J. H.

CHISELS, FRAMING, MORTISE
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Brodhead-Garrett Co.
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Stanley Tools
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(DIVISION OF SAX BROS., INC.)
Dept. IN, 1101 N. 3rd St., Milwaukee, Wis.

SHOP EQUIPMENT NEWS

(Continued from page 142)

ute depending on the thickness of the metal being fabricated.

This new tool is compact (12. in. over all) and lightweight (only 15 lb.), and is completely portable and easy to operate. It may be used with high efficiency in the shop, but the greatest advantages come from its portability and ease of use on the job. Material for ducts may be taken to the site flat or in space-saving nested sections, then rapidly assembled as needed. Thus the problems of trucking and storing bulky finished ducts is eliminated.

The Lectro-Lok is available through industrial and building supply distributors carrying the Millers Falls line of portable electric tools. Interchangeable slides for 1/8-in. or 1/2-in. pockets may be purchased as accessories.

(For further details encircle index code 0318)

DELTA'S NEW RADIAL DRILL PRESS

A new low-cost radial drill press, that offers unequaled capacity and flexibility in its class and price range, has been introduced by Rockwell Manufacturing Company's Delta Power Tool Division.

The new Delta Radial Drill Press is designed to drill to the center, or any point, of a 32-inch square and is ideal for rapid multiple drilling operations, horizontal drilling, and angular drilling. Capable of doing accurate sanding, shaping, routing, mortising, plug cutting, and many other operations, the new machine is particularly applicable for pattern, woodworking and furniture shops, and light industry.

New Delta Radial Drill Press

The radial drill press features a head that swivels 360 deg., around the column and tilts more than 90 deg., to the right and left. Because the work always remains parallel with the base, every operation can be done safely, easily, and accurately.

The new Delta Radial Drill Press also features: choice of four speeds — 700, 1250, 2400, and 4700 r.p.m. — for drilling a variety of materials; controls conveniently grouped to facilitate operation, including a degree calibrated scale which assures accurate setting of head for angular drilling; a built-in stop which functions throughout full ram travel and simplifies resetting of the head to a vertical drilling position; a big 3/4 by 23 3/4 by 15 7/8-inch table — adjustable through 360 deg. — that provides proper work support even for horizontal drilling operations. The table is mounted to a fully machined 8 1/2 by 9-inch cast iron table for those "extra" precision drilling operations.

For further information write to the manufacturer.

(For further details encircle index code 0319)

NEW FURNITURE LEG KITS

The Wilkenson Manufacturing Company, producer of wood and metal legs for fine furniture manufacturers, is now offering new Leg Kits to schools.

These complete metal (or wood) leg kits hold four metal legs, tapered or square, 16 wood screws, and four mounting brackets which permit straight or slanted positioning of legs.

New Furniture Legs

Legs are made in lengths from 3 to 28 in. high. Guaranteed finishes include Satin Brass, Pewter, and Coppertone.

Students can install the brackets and legs in just a few minutes. Their beautiful slim styling lends a professional look to woodworking projects, such as tables or Hi-Fi cabinets made in school workshops.

All legs have a swivel glide tip that assures firm rest on practically any floor.

Further information is available.

(For further details encircle index code 0320)

NO. 21 ADJUSTABLE STOP GAUGE

The No. 21 Adjustable Stop Gauge, introduced by L. Stahl, the manufacturer, is used on radial and bench saws to assure accurate cutting of wood stock. It can be set to an exact measurement on the scale graduated with 1/16-inch markings.

The craftsman can cut precise lengths of wood quickly and accurately.

The gauge body is cast of durable lightweight aluminum. The graduated scale bar is made of steel that travels in an accurately machined slot. This bar slides in the slot to the adjustment setting on the scale and is locked in place so the adjustment will not loosen from vibration of the saw.

(Continued on page 146)

CHISELS, Metal Cutting and Wood Carving
Brodhead-Garrett Co.
Cincinnati Tool Co.
Dixon, Inc., William
Duro Metal Products Co.
Greenlee Tool Co.
Patterson Bros.
Saxcrafts
Upholstery Supply Co.
Williams Co., J. H.

CHUCKS, COMBINATION
Atlas Press Co.
Brodhead-Garrett Co.
South Bend Lathe Works

CHUCKS, DRILL
Brodhead-Garrett Co.
Chicago-Latrobe
Cincinnati Lathe & Tool Co.
DeWalt Products Corp.
Dixon, Inc., William
Patterson Bros.
Stanley Electric Tools

CHUCKS, INDEPENDENT, Universal Combination
Brodhead-Garrett Co.
Boice-Crane Company
L. W. Chuck Co.
Patterson Bros.
South Bend Lathe Works

CIRCULAR-SAW BENCHES
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Duro Metal Products Co.
Oliver Machinery Co.
Patterson Bros.
Skil Corp.
Upholstery Supply Co.
Walker-Turner Co., Inc.
Yates-American Machine Co.

CIRCULAR SAWS
Atlas Press Co.
Boice-Crane Co.
Brodhead-Garrett Co.
Columbia Machinery & Supply Co.
DeWalt Products Corp.
Duro Metal Products Co.
Northfield Foundry & Machine Co.
Oliver Machinery Co.
Patterson Bros.
Porter-Cable Machine Co.
Skil Corp.
Walker-Turner Div.

CLAMPS, ADJUSTABLE, BAR
Adjustable Clamp Co.
Armstrong Bros. Tool Co.
Brodhead-Garrett Co.
Cincinnati Tool Co.
Grand Specialties Co.
Lufkin Rule Co.
Patterson Bros.
Starrett Co., L. S.
Upholstery Supply Co.
Williams Co., J. H.

CLAMPS, CARRIAGE, SCREW, WELDERS
Adjustable Clamp Co.
Brodhead-Garrett Co.
Cincinnati Tool Co.
Grand Specialties Co.
Lufkin Rule Co.
Patterson Bros.
Upholstery Supply Co.
Williams Co., J. H.
Wilton Tool Mfg. Co., Inc.

CLEANERS, FILE
Cincinnati Tool Co.
Dixon, Inc., Wm.
Knudson, E. C.
Saxcrafts

COMBINATION SQUARES
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Brown & Sharpe Mfg. Co.
Fairgate Rule Co.
Lufkin Rule Co.
Patterson Bros.
Stanley Tools
Starrett Co., The L. S.

COMPOSING STICKS
Rouse & Co., H. B.

COMPOUNDS, CARBURISING, CASE, HARDENING
Kasenit Co.

CONTROLLERS, ELECTRIC
Electric Hotpack Co., Inc.

COPING SAW BLADES
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Delta Mfg. Co.
Dixon, Inc., William
Patterson Bros.
Saxcrafts
Upholstery Supply Co.

COPING SAWS
Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.
Saxcrafts
Upholstery Supply Co.

COPPER NOVELTIES
Copper Shops
Donjer Products
School Products Co.

COPPER PROJECTS
Craft Metal Corp.
Donjer Products

COPYING MACHINES — COPYFLEX
Bruning Co., Inc., Charles

CORD, FURNITURE
Upholstery Supply Co.

COUNTERSINKS
Brodhead-Garrett Co.
Chicago-Latrobe
Patterson Bros.
Stanley Tools
Upholstery Supply Co.

CURVES, IRREGULAR
Alvin & Company
Brodhead-Garrett Co.
Dick Blick Co.
Dietzgen Co., Eugene
DeWalt Products Corp.
Duro Metal Products Co.
Modern School Supplies
Post Company, Frederick
Weber Company, F.

CUT-OFF SAWS
Boice-Crane Co.
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Duro Metal Products Co.
Oliver Machinery Co.
Porter-Cable Machine Co.
Skil Corp.
Yates-American Machine Co.

CUTTER HEADS
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Patterson Bros.
Yates-American Machine Co.

CUTTER & TOOL GRINDERS
Boice-Crane Co.
Brodhead-Garrett Co.,
Brown & Sharpe Mfg. Co.
LeBlond Machine and Tool Co., R. K.
Patterson Bros.
Skil Corp.

CYLINDER PRINTING PRESS
Challenge Machinery Co.

D

DADO HEADS
Atlas Press Co.
Boice-Crane Co.
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Duro Metal Products Co.
Oliver Machinery Co.
Patterson Bros.
Skil Corp.
Walker-Turner Co., Inc.
Yates-American Machine Co.

DESKS, Instructors'
Parent Metal Products, Inc.

DIVIDING HEAD
L. W. Chuck Co.
U. S. Burke Machine Tool Div.

DO IT YOURSELF PROJECTS
Old South Pattern Co.
Precision Apparatus Co., Inc.
Saxcrafts
School Products Co.
Stueck, Inc., W. Whitney

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Brodhead-Garrett Co.
Patterson Bros.

DOWELING JIGS
Brodhead-Garrett Co.
Patterson Bros.
Stanley Tools
Upholstery Supply Co.

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Alvin & Company
Bruning Co., Inc., Charles
Modern School Supplies
Universal Drafting Machine Corp.

DRAFTING PAPER
Alvin & Company
Bruning Co., Inc., Charles
General Finishes Sales & Service Co.
Modern School Supplies
School Products Co.

DRAFTING PENS
Alvin & Company
Berger Scientific Supplies, Inc.
Brodhead-Garrett Co.
Bruning Co., Inc., Charles
Dick Blick Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
V & E Mfg. Company
Weber Co., F.

DRAFTING TABLES
Alvin & Company
Berger Scientific Supplies Corp.
Brodhead-Garrett Co.
Dick Blick Co.
Dietzgen Co., Eugene
Garrett Tubular Products, Inc.
Hamilton Mfg. Co.
Modern School Supplies
Parent Metal Products, Inc.
Post Company, Frederick
Sheldon Equip Co., E. H.
Stacor Equipment Co.
Standard Pressed Steel Co.
Stoner Wood Products Co.
Tolerton Co.
Weber Company, F.

DRAFTSMEN'S INSTRUMENTS
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Brodhead-Garrett Co.
Bruning Co., Inc., Charles
Dick Blick Co.
Dietzgen Co., Eugene
Fairgate Rule Co.
Modern School Supplies
Post Company, Frederick
School Products Co.
V & E Mfg. Company
Weber Company, F.

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Bruning Co., Inc., Charles
Dietzgen Co., Eugene
Modern School Supplies
Post Co., Frederick
V & E Mfg. Company
Weber Co., F.

DRAWING OUTFITS
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Brodhead-Garrett Co.
Bruning Co., Inc., Charles
Dick Blick Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
Saxcrafts
V & E Mfg. Company
Weber Co., F.

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Bruning Co., Inc., Charles
Dick Blick Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
Saxcrafts
School Products Co.
Weber Co., F.

DRILL PRESSES
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Boice-Crane Company
Brodhead-Garrett Co.
Columbia Machinery & Supply Co.
Delta Mfg. Co.
Duro Metal Products Co.
Patterson Bros.
Saxcrafts
South Bend Lathe Works

DRILL SHARPENERS
Atlas Press Co.
Brodhead-Garrett Co.
Patterson Bros.
Snap-on Tools Corp.

DRILL STANDS, BENCH, POST, PEDESTAL
Black & Decker Mfg. Co.
Boice-Crane Co.
Brodhead-Garrett Co.
Duro Metal Products Co.
Patterson Bros.
Skil Corp.
Snap-on Tools, Corp.
South Bend Lathe Works
Stanley Electric Tools

DRILLING MACHINES, PORTABLE ELECTRIC
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Patterson Bros.
Porter-Cable Machine Co.
Skil Corp.
Snap-on Tools Corp.
Stanley Electric Tools

DRILLING MACHINES, RADIAL
Boice-Crane Co.
Walker-Turner Div.

DRILLS
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Chicago-Latrobe
Patterson Bros.
Saxcrafts
Skil Corp.
Snap-on Tools Corp.
Stanley Electric Tool Div.
Sunbeam Corp.
Upholstery Supply Co.

DRILLS, BENCH AND FLOOR, HIGH SPEED
Atlas Press Co.
Boice-Crane Co.
Brodhead-Garrett Co.
Delta Mfg. Co.
Duro Metal Products Co.
Patterson Bros.
South Bend Lathe Works
Walker-Turner Co.

DRILLS, BREAST
Brodhead-Garrett Co.
Patterson Bros.
Snap-On Tools Corp.
Stanley Tools

DRILLS, CARVING FOR PLASTICS
Brodhead-Garrett Co.
Elbar Products
Patterson Bros.
Saxcrafts

DRILLS, HAND
Dixon, Inc., William
Patterson Bros.
Snap-on Tools Corp.
Stanley Tools
Upholstery Supply Co.

DUST COLLECTORS
Craftools, Inc.
Patterson Bros.
School Products Co.

E

ELECTRIC WELDING EQUIPMENT & SUPPLIES
Brodhead-Garrett Co.
Delta Mfg. Co.
Marquette Mfg. Co.
Standard Pressed Steel Co.

ELECTRIC EQUIPMENT, WIRE & SUPPLIES
Brodhead-Garrett Co.
Ohmite Mfg. Co.

ELECTRIC GENERATORS
Standard Electric Time Co.

ELECTRIC MOTORS
Boice-Crane Co.
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Dixon, Inc., Wm.
Patterson Bros.

ELECTRIC SOLDERING IRONS
Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.
Snap-on Tools Corp.
Stanley Tools

ELECTRICAL INSTRUMENTS
Brodhead-Garrett Co.
Electronic Instrument Co. (EICO)
Precision Apparatus Co., Inc.
Thermo Electric Mfg. Co.

ELECTRONIC TRAINING PACKAGES
Dumville Instrument Co.
Philco TechRep Div.
Science Electronics

ENAMELING ON COPPER SUPPLIES
Copper Shop
Craft Metal Corp.
Craftools, Inc.
Dixon, Inc., William
Saxcrafts
School Products Co.

ENGRAVERS' TOOLS AND SUPPLIES
Dixon, Inc., William
Plasticast Co.
Saxcrafts

ENVELOPES
Western States Envelope Co.

EXCHANGE PROGRAM
Chown Hardware Co.

F

FILES AND RASPS
Brodhead-Garrett Co.
Dixon, Inc., William
Foley Mfg. Co.
Patterson Bros.
Saxcrafts
Snap-on Tools Corp.
Upholstery Supply Co.

FILING CASES
Hamilton Mfg. Co.
Parent Metal Products, Inc.
Weber Co., F.

FILING MACHINES
Boice-Crane Co.
Foley Mfg. Co.
Sales Service Mfg. Co.

FILMS, INDUSTRIAL TRAINING, TEACHING, ETC.
Aluminum Co. of America
Dick Blick Co.
Eastman Kodak Co.
Jam Handy Organization
South Bend Lathe Works
Starrett Co., The L. S.

FINISHING MATERIALS
Brodhead-Garrett Co.
Donjer Products
General Finishes Sales & Service Co.
Patterson Bros.
Upholstary Supply Co.

FIRE BRICK AND CEMENT
Electric Hotpack Co., Inc.
Saxcrafts

FIRE CLAY
Brodhead-Garrett Co.
Saxcrafts
Western Materials Co.

FISH GLUE, LIQUID
Saxcrafts
Upholstery Supply Co.

FLASKS
Brodhead-Garrett Co.
Sterling National Industries, Inc.
Western Materials Co.

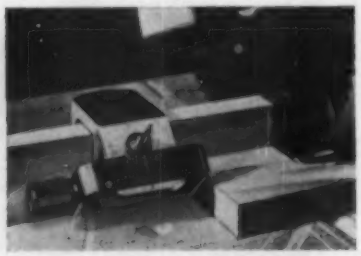
FLEXIBLE SHAFT AND MOTOR OUTFITS
Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.
Walker-Turner Co., Inc.

FLEXIBLE STEEL TAPE RULES
Alvin & Company
Brodhead-Garrett Co.
Dietzgen Co., Eugene
Modern School Supplies
Patterson Bros.
Snap-on Tools Corp.
Weber Co., F.

SHOP EQUIPMENT NEWS

(Continued from page 144)

To install the No. 21 adjustable stop gauge on bench saws, fasten a piece of standard 1 by 2-in. lumber of desired length to the miter attachment. Clamp the No. 21 adjustable stop gauge to this rail at approximately the length of stock



No. 21 Adjustable Stop Gauge

wanted. Then turn the knurled knob to the precise length to be cut.

On radial and swing saws, set the top of fence 1⅝ in., above the table. Fasten No. 21 adjustable stop gauge to the fence and adjust as above.

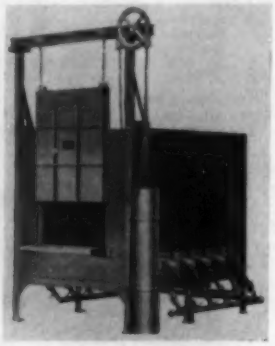
This is an essential tool for precision cutting by craftsmen who use power saws such as cabinetmakers, carpenters, and hobbyists, and is ideal for school woodwork shops.

Additional information available by writing to the manufacturer.

(For further details encircle index code 0321)

"BUZZER" GAS-FIRED HEAT TREATING FURNACES

Charles A. Hones, Inc., have added a new 30-inch series of larger "Buzzer" Gas-Fired Heat Treating Furnaces, four models in all, to their existing line of ten such



"Buzzer" Gas-Fired Heat Treating Furnace

furnaces. The expansion has been accomplished by Hones to meet the needs of industry for standard units of higher heat ranges and larger work capacities.

Illustrated is a still larger, special size furnace with inside work space measuring 36 by 72 by 36 in. high. It is Model No. 367236. It attains quick heat-ups to 2000 deg., F., with an hourly input of 1½ million BTU's, 50 per cent more than the largest cataloged "Buzzer" furnaces in the group.

This ruggedly constructed unit has a massive chain drive door for positive action, greater heat retention, and safe easy operation. Higher load strength and wear resistance are achieved with its silicon carbide hearth, and temperature uniformity, economy and operator comfort are assured with full insulating firebrick lining.

Six properly proportioned "Buzzer" atmospheric venturi burners — operating without blowers, power or other auxiliaries — provide easy, quiet, rapid and versatile heating capabilities for low carbon steels, preheating high speed steels, heating castings, boxes or fabrications, for precision castings and many other applications.

External pilots make for instant, easy, and safer full view lighting. Pre-packaged automatic temperature controls are available as optional equipment. Larger, special sizes and styles beyond the ranges of the standard fourteen units in the "Buzzer" line can be built to order.

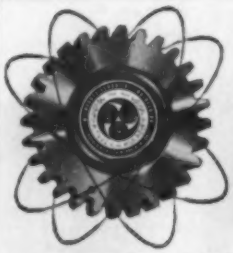
Descriptive literature is available on request.

(For further details encircle index code 0322)

SPOTCHECK — IMPROVED DYE PENETRANT INSPECTION

Magnaflux Corporation have introduced Spotcheck — the dye penetrant inspection which will find cracked parts quickly, easily, and inexpensively. These materials are now available in new fire-safe formulas, high-flash and nonflammable. New Spotcheck can be used practically anywhere in the plant, and in the field. Proved most dependable by thousands of users, "Spray-

(Continued on page 148)



preparing young men for engineering careers

For over 55 years, the Milwaukee School of Engineering has provided outstanding service in technical education. Today, in this Age of Space, with its rapid developments in automation, avionics, missiles, radar and rocketry, MSOE is preparing even greater numbers of young men for careers as engineers and engineering technicians through these courses of study:

4-year Bachelor of Science degree programs in Electrical and Mechanical Engineering.

2-year Associate in Applied Science degree programs in Electronics Communications, Electrical Power, Computer, Air Conditioning, Metallurgical, and Industrial Technology.

3-month Preparatory Program to strengthen the academic background of the student who has engineering aptitude but requires additional preparation before admission to a college-level course in engineering or technology.

Qualified students can receive assistance from the MSOE Student Financial Aid Program of scholarships, work-study programs, loans, and tuition installment plans. For further information, write for free catalog.

NEW CLASSES START QUARTERLY

September • January • April • June

Visitors Welcome for Tours and Counseling

Milwaukee School of Engineering

Dept. IA-360, 1025 N. Milwaukee Street, Milwaukee 1, Wis.

MS-137

Summer School in Colorado at a School Recognized as a Leader in:

- Guidance and Counseling
- Physical Education
- Industrial Arts Education
- Psychology
- School Administration
- Vocational Education — All Services
- Administration and Supervision of Vocational Education
- Supporting Courses in Major Academic Areas

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FIRST FOUR WEEK TERM: June 20–July 15
SECOND FOUR WEEK TERM: July 18–Aug. 12

Visit

- Central City Opera
- Red Rocks Amphitheater
- Cheyenne Frontier Days
- And Many Scenic Wonders

COMBINE A VACATION AND A PRACTICAL EDUCATION AT A MILE HIGH LEVEL

Address Correspondence to Dean of Summer Session

COLORADO STATE UNIVERSITY

FORT COLLINS, COLORADO

FLOCK EQUIPMENT AND SUPPLIES
Brodhead-Garrett Co.
Dick Blick Co.
DonJer Products
Saxcrafts
School Products Co.

FLOORING — HARD MAPLE & RED OAK
Wells Lumber Co., J. W.

FLUX, SOLDERING
Brodhead-Garrett Co.
Dixon, Inc., William
Saxcrafts
Johnson Gas Appliance Co.
Kester Solder Co.
Patterson Bros.

FOLDING RULES
Alvin & Company
Brodhead-Garrett Co.
Dietzgen Co., Eugene
Lufkin Rule Co.
Modern School Supplies
Patterson Bros.
Stanley Tools
Upholstery Supply Co.

FORGE TOOLS
Brodhead-Garrett Co.
Patterson Bros.
Stanley Tools

FORGES, Annealing & Melting
American Gas Furnace Co.
Brodhead-Garrett Co.
Dixon, Inc., William
Hones, Inc., Charles A.
Patterson Bros.
Sunbeam Equipment Corp.

FORGES, GAS
American Gas Furnace Co.
Brodhead-Garrett Co.
Dixon, Inc., William
Hones, Inc., Charles A.
Patterson Bros.
Sunbeam Equipment Corp.
Western Materials Co.

FOUNDRY EQUIPMENT & SUPPLIES
Brodhead-Garrett Co.
Sterling National Industries, Inc.
Tolerton Co.
Western Materials Co.

FREQUENCY METERS, Portable and Switchboard
Brodhead-Garrett Co.

FURNACES, Annealing, Case-Hardening, Forging, Heat Treating, Metal Melting, Soldering, Tempering
American Gas Furnace Co.
Brodhead-Garrett Co.
Dixon, Inc., William
Electric Hotpack Co., Inc.
Johnson Gas Appliance Co.
Kasenit Co.
Patterson Bros.
Sunbeam Equipment Corp.
Thermo Electric Mfg. Co.
Western Materials Co.

FURNITURE FOR SHOP PROJECTS
Old South Pattern Co.
Sheldon Equip. Co., E. H.
Standard Pressed Steel Co.

G

GALVANOMETERS
Dumville Instrument Co.
Precision Apparatus Co., Inc.

GAUGES, BIT, CABINET, RULE, AND SQUARE
Brodhead-Garrett Co.
Patterson Bros.
Stanley Tools

GAUGES, CALIPER
Brodhead-Garrett Co.
Lufkin Rule Co.
Patterson Bros.
Starrett Co., L. S.

GAUGES, MARKING, THICKNESS, AND THREAD
Brodhead-Garrett Co.
Brown & Sharpe Mfg. Co.
Duro Metal Products Co.
Lufkin Rule Co.
Magnaflux Corp.
Patterson Bros.
Starrett Co., L. S.

GENERATOR TEST BENCHES
Standard Electric Time Co.
Standard Pressed Steel Co.

GLASS CUTTER
Brodhead-Garrett Co.
Lufkin Rule Co.
Patterson Bros.
Saxcrafts
Upholstery Supply Co.

GLAZING TOOLS
Brodhead-Garrett Co.
Saxcrafts
Upholstery Supply Co.

GLUE
Bordon Co., The
Brodhead-Garrett Co.
General Finishes Sales & Service Co.
Higgins Ink Co., Inc.
Patterson Bros.
Saxcrafts
Upholstery Supply Co.

GLUE POTS, ELECTRIC
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Oliver Machinery Co.
Patterson Bros.
Upholstery Supply Co.

GRINDERS AND BUFFERS, PORTABLE ELECTRIC
Black & Decker Mfg. Co.
Boice-Crane Company
Brodhead-Garrett Co.
Craftools, Inc.
Delta Mfg. Co.
Patterson Bros.
Porter-Cable Machine Co.
Skil Corp.
Stanley Electric Tools
Walker-Turner Div.

GRINDERS, BENCH, PEDESTAL TYPE
Atlas Press Co.
Baldor Electric Co.
Black & Decker Mfg. Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Duro Metal Products Co.
Mummert-Dixon Co.
Patterson Bros.
Skil Corp.
Snap-on Tools Corp.
Stanley Electric Tools
U. S. Burke Machine Tool Div.
Walker-Turner Div.

GRINDERS, OILSTONE
Atlas Press Co.
Brodhead-Garrett Co.
Mummert-Dixon Co.
Oliver Machinery Co.

GRINDERS, TOOL ROOM, SURFACE
Atlas Press Co.
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Brown & Sharpe Mfg. Co.
South Bend Lathe Works
Stanley Electric Tool Div.

GRINDING MACHINES
Plain Universal, Centerless
Atlas Press Co.
Brodhead-Garrett Co.
Brown & Sharpe Mfg. Co.

GRINDING WHEELS
Atlas Press Co.
Brodhead-Garrett Co.
DeWalt Products Corp.
Duro Metal Products Corp.
Patterson Bros.
Saxcrafts
Skil Corp.
Snap-on Tools Corp.
Stanley Electric Tool Div.

H

HACKSAW BLADES
Brodhead-Garrett Co.
Duro Metal Products Co.
K-D Mfg. Co.
Patterson Bros.
Saxcrafts
Snap-on Tools Corp.
Starrett Co., The L. S.
Upholstery Supply Co.

HACKSAWS, Portable, Electric, Power
Berkroy Products Co.
Brodhead-Garrett Co.
Duro Metal Products Co.
K-D Mfg. Co.
Misener Mfg. Corp.
Patterson Bros.
Porter-Cable Machine Co.
Saxcrafts
Snap-on Tools Corp.

HAMMERS
Brodhead-Garrett Co.
Dixon, Inc., William
Duro Metal Products Co.
Patterson Bros.
Porter-Cable Machine Co.
Saxcrafts
Snap-on Tools Corp.
Stanley Tools
Upholstery Supply Co.
Williams Co., J. H.

HAMMERS, PORTABLE ELECTRIC
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Skil Corp.
Stanley Electric Tools

HAND SAWS, PORTABLE ELECTRIC
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Patterson Bros.
Porter-Cable Machine Co.
Saxcrafts
Skil Corp.
Stanley Electric Tools
Upholstery Supply Co.

HAND SCREWS
Adjustable Clamp Co.
Brodhead-Garrett Co.
Cincinnati Tool Co.
Patterson Bros.
Upholstery Supply Co.

HANDICRAFT SUPPLIES
Brodhead-Garrett Co.
Copper Shop
Craft Metal Corp.
Craftools, Inc.
Craftsman Wood Service Co.
Dixon, Inc., William
Donjer Products
General Finishes Sales & Service Co.
Hammett Co., J. L.
Old South Pattern Co.
Patterson Bros.
Saxcrafts
School Products Co.
Upholstery Supply Co.

HARDIES
Brodhead-Garrett Co.
Patterson Bros.
Stanley Tools

HEAT-FLOW METERS
Brodhead-Garrett Co.

HEATING ELEMENTS, ELECTRIC
Brodhead-Garrett Co.
Electric Hotpack Company, Inc.
Hones, Inc., Charles A.
Saxcrafts

HEAT-TREATING EQUIPMENT
American Gas Furnace Co.
Brodhead-Garrett Co.
Electric Hotpack Company, Inc.
Johnson Gas Appliance Co.
Kasenit Co.
Patterson Bros.
Saxcrafts
Sunbeam Equipment Corp.
Thermo Electric Mfg. Co.
Western Materials Co.

HOT PLATES
Thermo Electric Mfg. Co.

I

IMPACT TOOL, Portable Electric
Skil Corp.
Snap-on Tools Corp.

IMPORTED WOODWORKING TOOLS
Mittermeier, Frank
Saxcrafts
Upholstery Supply Co.

IMPORTERS' GERMAN DRAWING INSTRUMENTS
Alvin & Company
Dick Blick Co.
Modern School Supplies

INDICATING INSTRUMENTS, ELEC.
Precision Apparatus Co., Inc.

INDUSTRIAL ARTS AWARDS
Ford Motor Co.

INK REMOVERS
Alvin & Company
Dietzgen Co., Eugene
Higgins Ink Co., Inc.
Modern School Supplies
Saxcrafts
Weber Company, F.

INKS, DRAWING AND COLORED
Alvin & Company
Brodhead-Garrett Co.
Dick Blick Co.
Dietzgen Co., Eugene
Higgins Ink Co., Inc.
Modern School Supplies
Post Company, Frederick
Saxcrafts
School Products Co.
Weber Company, F.

INKS, PRINTING
Brodhead-Garrett Co.
Driscoll & Co., Martin
Saxcrafts

J

JEWELERS' TOOLS, EQUIPMENT AND SUPPLIES
Brodhead-Garrett Co.
Craftools, Inc.
Dixon, Inc., William
Patterson Bros.
Saxcrafts
Wilton Tool Mfg. Co., Inc.

JIG SAWS
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Co.
Duro Metal Products Co.
Oliver Machinery Co.
Patterson Bros.
Porter-Cable Machine Co.
Saxcrafts
Skil Corp.
Walker-Turner Co., Inc.
Yates-American Machine Co.

JOINTERS, BENCH, HAND
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Co.
Duro Metal Products Co.
Northfield Foundry & Mach. Co.
Oliver Machinery Co.
Patterson Bros.
Walker-Turner Co., Inc.
Yates-American Machine Co.

K

KEENE CEMENT
Brodhead-Garrett Co.

KILNS
Brodhead-Garrett Co.
Copper Shop
Craftools, Inc.
Electric Hotpack Company, Inc.
Saxcrafts
School Products Co.
Western Materials Co.

KNIVES, BAND, MACHINE
Brodhead-Garrett Co.
Oliver Machinery Co.
Patterson Bros.
Yates-American Machine Co.

KNIVES, HOBBY
Alvin & Company
Brodhead-Garrett Co.
Dixon, Inc., William
Modern School Supplies
Saxcrafts
School Products Co.

KNIVES, SLOYD
Alvin & Company
Brodhead-Garrett Co.
Dick Blick Co.
Dixon, Inc., William
Modern School Supplies
Patterson Bros.
Saxcrafts
School Products Co.

KNOCK-DOWN FURNITURE
Bedford Lumber Co.
Brodhead-Garrett Co.
Giles & Kendall

KNURLS
Armstrong Bros. Tool Co.
Brodhead-Garrett Co.
Brown & Sharpe Mfg. Co.
Patterson Bros.
Williams & Co., J. H.

L

LABORATORY STANDARD INSTRUMENTS
Electric Hotpack Co., Inc.
Precision Apparatus Co., Inc.

LAMP PARTS & SUPPLIES
Gyro Lamp & Shade Co.

LATEX MOLDING COMPOUNDS
Saxcrafts
School Products Co.

LATHE ATTACHMENTS
Armstrong Bros. Tool Co.
Atlas Press Co.
Brodhead-Garrett Co.
DeWalt Products Corp.
Duro Metal Products Corp.
Patterson Bros.
Sheldon Machine Co., Inc.
South Bend Lathe Works
Walker-Turner Div.
Williams Co., J. H.

LATHES, Bench, Metal Working
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Duro Metal Products Co.
LeBlond Machine Tool Co., R. K.
Logan Engineering Co.
Patterson Bros.
Sheldon Machine Co., Inc.
South Bend Lathe Works

LATHES, GAP BED
Boice-Crane Company
Brodhead-Garrett Co.
Duro Metal Products Corp.
LeBlond Machine Tool Co., Inc.
Walker-Turner Co., Inc.

LATHES, SMALL PRECISION
Atlas Press Co.
Brodhead-Garrett Co.
DeWalt Products Corp.
South Bend Lathe Works
Sheldon Machine Co., Inc.

LATHES, SPINNING
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
Dixon, Inc., William
Oliver Machinery Co.
Patterson Bros.
Sheldon Machine Co., Inc.
Walker-Turner Co., Inc.

LATHES, WOODWORKING
Atlas Press Co.
Boice-Crane Company
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Mfg. Co.
Duro Metal Products Co.
Oliver Machinery Co.
Patterson Bros.
Walker-Turner Co., Inc.
Yates-American Machine Co.

LAYOUT SURFACE PLATES
Challenge Machinery Co.

LEAD AND RULE CUTTERS
Brodhead-Garrett Co.
Rouse Co., H. B.

LEAD HOLDERS, DRAFTING
Alvin & Company

LEADS, DRAFTING
Alvin & Company
X-acto Crescent Prod. Co.

LEATHER
Brodhead-Garrett Co.
Constantine & Son, Albert
Larson Co., J. C.
Saxcrafts
Tandy Leather Co.
Upholstery Supply Co.

LEATHER WORKING TOOLS AND SUPPLIES
Brodhead-Garrett Co.
Dixon, Inc., William
Larson Co., J. C.
Saxcrafts
Tandy Leather Co.

LEGS — WOOD & METAL
Wilkenson Mfg. Co.

LETTERS AND FIGURES FOR STAMPING METALS
Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.

LEVELS
Brodhead-Garrett Co.
Bruning Co., Inc., Charles
Dietzgen Co., Eugene
Lufkin Rule Co.

SHOP EQUIPMENT NEWS

(Continued from page 146)

On" Spotcheck is now more than ever your simplest, most convenient dye penetrant inspection, for locating cracks, seams, porosity, and other defects open to the surface, in almost any solid material. Nontoxic, though use with good ventilation is

Type SK-3 Spotcheck Kit

required, as for any cleaner type materials. These nonflammable materials are not carbon-tetrachloride base. They are safer chlorinated hydrocarbons used widely in industry. Where freedom from chlorine is desired in testing high nickel steel, use SKL-3, SKD-1 and SKC-1 materials in bulk. These are completely free of constituent chlorine.

For low bulk material prices on new nonflammable and high-flash regular grade and water-washable Spotcheck, write to Magnaflux Corporation.

(For further details encircle index code 0323)

TRINDL MODEL ARC WELDER

Trindl Products, Ltd., manufacturers of quality industrial-type electric arc welders and pipe thawers, announces a new popularity of its Model 125A Arc Welder. Extensive use in home workshop, automatic bowling alleys, garage, farm and training centers, has caused this tremendous upsurge. Trindl credits this result to their 40 years of research and design in the manufacture of equipment suited to the student and others interested in simplified, yet professional welding, brazing, cutting, soldering, etc.

Model 125A Arc Welder

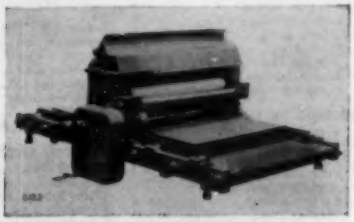
Acclaimed for its versatility, this 110/220 volt unit handles work of ½ in. in thickness and electrodes from 1/16 in. to 5/32 in. Sixteen instant heat stages are available and with carbon arc torch attachment, the Trindl 125A does superior work on all types of metals. Model 125A is shipped complete with headshield, insulated electrode holder, cables, welding rods, and detailed instructions. All machines bear a full year guarantee in continuous operation.

Write for further information.

(For further details encircle index code 0324)

NEW CRAFTOOL 24" ETCHING PRESS

The introduction of a large 24 by 40 in. Etching Press by Craftools, Inc., now enlarges the scope of the professional and university printmaker in producing large etchings.



Craftool Etching Tool

This new 24 in. Press incorporates many technical features never before used in an etching press:

1. The large cast iron bed has a positive engagement through a rack and pinion gear with the upper roller, insuring a positive and sensitive movement of the bed.

2. The vertical adjustment of the upper 8¼ in. diameter steel roller is controlled by a single adjusting handle which insures a positive parallel adjustment from a single point.

3. A series of 7 compound gears actuate both the movement of the bed and the upper steel roller and permits an easy and sensitive operation in pulling prints. It re-

(Continued on page 150)

Oswego — Study this summer at the College by the lake . . .

Oswego — State University of New York College of Education

Oswego — OSWEGO

The State University of Education at Oswego holds a significant position among schools engaged in the preparation of teachers. Founded in 1861, it has consistently stood for leadership and service in education.

The Division of Industrial Arts and Vocational-Industrial Education at Oswego enjoys a national and international reputation. Oswego is the largest industrial arts teacher preparing college in the nation. A distinguished resident and visiting faculty will offer a wide variety of both cultural and professional courses during the 1960 Summer Session.

The facilities for pleasant summer living at Oswego are difficult to parallel. The college's swimming beach may be viewed from the beautiful Lakeside Dining Hall. Residence halls for single people and married couples are located at the edge of Lake Ontario, and, like the dining hall, command a magnificent view of the Lake. The riding stables, observatory, college union, picnic areas, tennis courts and other recreational features are enjoyed by students during the ideal summer weather, and a well-rounded social and concert program provides interests for all those who wish to participate as their studies permit.

Oswego offers the ideal site for summer study. Personal and professional rewards await those who wish to improve competence, further specialize, or work toward completion of degree and certification requirements.

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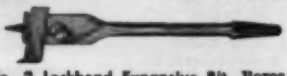

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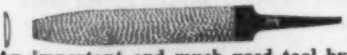

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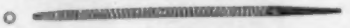

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SHOP EQUIPMENT NEWS

(Continued from page 148)

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A copy of the specification manual is available upon request.

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(Continued on page 152)

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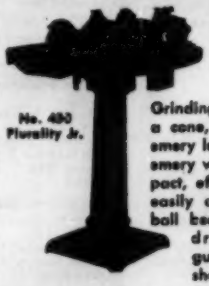

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Wayne University
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SCREWS, WOOD, MACHINE, DOWEL & DRIVE
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Upholstery Supply Co.

SCREW CLAMPS
Adjustable Clamp Co.
Brodhead-Garrett Co.
Cincinnati Tool Co.
Columbian Vise & Mfg. Co.
Patterson Bros.
Williams & Co., J. H.

SCREW DRIVERS
Brodhead-Garrett Co.
Duro Metal Products Corp.
Irwin Auger Bit Co.
K-D Mfg. Co.
Patterson Bros.
Snap-on Tools Corp.
Stanley Tools
Upholstery Supply Co.
Williams & Co., J. H.

SCREW DRIVERS, ELECTRIC
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Skil Corp.
Stanley Electric Tools

SCROLL SAWS
Brodhead-Garrett Co.
Boice-Crane Co.
Delta Mfg. Co.
DeWalt Products Corp.
Dixon, Inc., Wm.
Duro Metal Products Corp.
Patterson Bros.

SEALERS AND FINISHES
General Finishes Sales & Service Co.
Patterson Bros.

SHAPER ATTACHMENTS
Heinrich Tools, Inc.
Patterson Bros.
Skil Corp.

SHAPERS, ELECTRIC
Brodhead-Garrett Co.
DeWalt Products Corp.
Patterson Bros.
Porter-Cable Machine Co.
Stanley Electric Tool Co.

SHAPERS, METAL
Atlas Press Co.
Brodhead-Garrett Co.
Logan Engineering Co.
Patterson Bros.
Sales Service Mfg. Co.
Sheldon Machine Co., Inc.
South Bend Lathe Works
Williams & Co., J. H.

SHAPERS, WOODWORKING
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Boice-Crane Co.
Brodhead-Garrett Co.
Delta Mfg. Co.
DeWalt Products Corp.
Duro Metal Products Co.
Logan Engineering Co.
Northfield Foundry & Machine Co.
Oliver Machinery Co.
Patterson Bros.
Stanley Electric Tools
Walker-Turner Co., Inc.
Yates-American Machine Co.

SHEARS AND SCISSORS, FOR CUTTING METAL
Brodhead-Garrett Co.
Diamond Tool & Horseshoe Co.
Dick Blick Co.
Dixon, Inc., William
Heinrich Tools, Inc.
O'Neil-Irwin Mfg. Co.
Patterson Bros.
Peck, Stow & Wilcox Co.
Saxcrafts
Skil Corp.
Snap-on Tools Corp.
Stanley Electric Tool Div.

SHEET METAL EQUIPMENT AND SUPPLIES
American Pullmax Co.
Berkroy Products Co.
Black & Decker Mfg. Co.
Brodhead-Garrett Co.
Dixon, Inc., William
Heinrich Tools, Inc.
O'Neil Irwin Mfg. Co.
Patterson Bros.
Peck, Stow & Wilcox Co.
Saxcrafts
Standard Pressed Steel Co.
Tolerton Co.

SHOP COATS, APRONS
Can-Pro Corp.
School Products Co.

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Dixon, Inc., William
Patterson Bros.
Saxcrafts

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Dietzgen Co., Eugene
Weber Co., F.

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Berger Scientific Supplies Corp.
Brodhead-Garrett Co.
Dietzgen Co., Eugene
Modern School Supplies
Post Company, Frederick
Weber Co., F.

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Patterson Bros.
Standard Pressed Steel Co.
Tolerton Co.

SOLDERING FURNACES
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Brodhead-Garrett Co.
Dixon, Inc., William
Hones, Inc., Charles A.
Patterson Bros.

SOLDERING IRONS, ELECTRIC
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Dixon, Inc., William
Patterson Bros.
Saxcrafts
Snap-on Tools Corp.
Stanley Tools

SOLDERING SOLUTIONS
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Dixon, Inc., William
Kester Solder Co.
Patterson Bros.
Saxcrafts

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Brodhead-Garrett Co.
Dixon, Inc., William
Kester Solder Co.
Patterson Bros.
Saxcrafts

SPINNING EQUIPMENT AND TOOLS
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Brodhead-Garrett Co.
Dixon, Inc., William
Patterson Bros.

SPOKESHAVES
Brodhead-Garrett Co.
Patterson Bros.
Stanley Tools
Upholstery Supply Co.

SQUARES, BEVEL
Brodhead-Garrett Co.
Fairgate Rule Co.
Patterson Bros.
Rouse & Co., H. B.
Stanley Tools
Starrett Co., The L. S.
Upholstery Supply Co.

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Patterson Bros.
Starrett Co., The L. S.
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SQUARES, FRAMING, MITER, TRY
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Brown & Sharpe Mfg. Co.
Fairgate Rule Co.
Lufkin Rule Co.
Patterson Bros.
Rouse & Co., H. B.
Stanley Tools
Starrett Co., The L. S.
Upholstery Supply Co.

STAINS
Brodhead-Garrett Co.
General Finishes Sales & Service Co.
Larson Co., J. C.
Patterson Bros.
Saxcrafts

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Peck, Stow & Wilcox Co.

STARTERS, MOTOR, Electric
Brodhead-Garrett Co.
DeWalt Products Corp.
Rouse & Co., H. B.

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Brodhead-Garrett Co.
Brown & Sharpe Mfg. Co.
Dixon, Inc., William
Lufkin Rule Co.
Patterson Bros.
Peck, Stow & Wilcox Co.
Rouse & Co., H. B.
Saxcrafts
Snap-on Tools Corp.
Starrett Co., The L. S.

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Dixon, Inc., William
Lufkin Rule Co.
Patterson Bros.
Rouse & Co., H. B.
Saxcrafts
Stanley Tools
Starrett Co., The L. S.
Upholstery Supply Co.

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Brodhead-Garrett Co.
Dick Blick Co.
Saxcrafts

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Bruning Co., Inc., Charles
Dietzgen Co., Eugene
Garrett Tubular Products, Inc.
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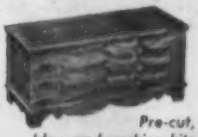

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Descriptive Material . . .

(Continued from page 150)

BOICE-CRANE BROCHURE

A new brochure on 18-in. and 24-in. constant power gearshift drill presses has been made available to anyone addressing a request to the Boice-Crane Company.

Included are specifications and full description of all features on seven models, including positive drive at all loads and speeds, instant speed selection, and an exclusive triple-action depth stop.

(For further details encircle index code 0328)

NEW MANUAL ON MICROFILMING OF ENGINEERING DRAWINGS

The Filmsort Company, a division of Minnesota Mining and Manufacturing Company, have reprinted from their publication, Filmsort Facts, an eight-page illustrated manual, detailing how the Air Materiel Command of the United States Air Force has converted engineering drawings and data to microfilm mounted in aperture cards. The title of the Filmsort manual is: *Standardization That Works — How Air Materiel Command Uses Microfilmed Engineering Data.*

The authors are Paul R. Durr, chief of Logistics Section, and Edward L. Todd, chief of Systems and Procedure Unit — Directorate of Supply, Headquarters, Air Materiel Command, Wright Patterson Air Force Base.

The manual is of prime importance to all Air Force contractors since new contracts require submission of engineering data on microfilm and punch cards.

(For further details encircle index code 0329)

BRUNING BOOKLET SHOWS HOW TO GET BEST MICROFILM RESULTS

Basic Microfilm Indexing and Filing Techniques — a booklet which shows how to make the most economical and efficient use of microfilm, has been published by the Charles Bruning Company, Inc.

The Bruning Company, which distributes a complete line of Documat microfilm equipment, prepared the illustrated booklet as a convenient guide on how to achieve maximum results from a microfilm system.

The booklet emphasizes the fact that planning is the most important key to any successful indexing and filing system. It then gives detailed information on how to implement a program.

After a discussion of the three principal ways to photograph records, the major methods of filing and indexing are explained. Other subjects graphically treated include visual and mechanical indexing aids, locating records, and cards and jackets for "unitizing" microfilm.

Copies of the booklet are available upon request.

(For further details encircle index code 0330)

NEW BULLETIN DESCRIBING MACHINISTS' VISES

The Columbian Vise & Mfg. Company have made available their new bulletin which describes their new line of machinists' vises.

The contents include complete specifications of their swivel base and stationary base vises. The latter can be converted to 360 deg. swivel type by the addition of a swivel kit. This is a new development.

Vises are guaranteed unbreakable. Their malleable iron castings are reinforced at all points of stress. Other features include replaceable "T" section hardened tool steel jaw faces and a longer back jaw body for perfect alignment. All but 6- and 8-in. sizes have large ground and polished anvils.

When writing for a copy of the bulletin, ask for L-1128A.

(For further details encircle index code 0331)

AMERICAN PULLMAX CATALOG

American Pullmax Company, Inc., have made available their 19-page catalog, in which are described and fully illustrated all the sizes of Pullmax machines.

This machine will cut straight edges or inside squares, circles, irregular shapes, and will also bead, joggle, edge bend, flange, slot cut, dish, cut and form louvers.

The Pullmax has been accepted as the most revolutionary and modern machine in the sheet metal industry. At present, 12 standard operations can be performed on each machine. Automotive, aircraft, appliance, and engineering departments in leading industries are continuously developing special tools and attachments to eliminate expensive dies for small run production.

For maintenance, the Pullmax is almost a complete sheet metal shop in itself. It works both in mild and stainless steels, nonferrous metals including brass, copper, aluminum, magnesium, wire mesh, raised lug floor plate, and also in certain plastics and fiberboard.

For more complete information, send for a copy of the Pullmax Catalog.

(For further details encircle index code 0332)

WALKER-TURNER BULLETIN

A new six-page, photo-illustrated bulletin, describing the new line of versatile Walker-Turner 15-inch drill presses, is now available from Rockwell Manufacturing Company.

The new line, with 4 7/16-inch spindle travel, combines the ruggedness and accuracy of production machines with the versatility and ease-of-operation of utility drill presses. Primarily production-line tools for metalworking, the new machines are versatile enough for use in small commercial shops.

The two-color bulletin describes the 40 bench, production and floor models, and the components available for making up special purpose equipment. The bulletin also includes specifications, catalog listings, motors and motor controls available and dimensional data.

For further information, write Rockwell Manufacturing Company, Walker-Turner Division.

(For further details encircle index code 0333)

NEW CATALOG SHOWS COMPLETE DI-ACRO SCHOOL LINE

O'Neil-Irwin Mfg. Company have anannounced a new 16-page catalog containing specifications, capacities, and cost information on Di-Acro Precision Machines and Accessories for school shops.

Catalog 59-1 is designed to serve as a guide to aid shop instructors and administrators in specifying Di-Acro equipment. The Manufacturer's Educational Services Program is also outlined.

The new catalog contains an expanded line of Di-Acro equipment for the metalworking, electrical, and plastics areas. This includes eight machinery package deals, available to school shops only, that enable the school to purchase a number of Di-Acro Precision Metalworking Machines at considerable savings over the cost of purchasing the same machines individually.

(Continued on page 154)

Lufkin Rule Co.
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Brodhead-Garrett Co
Brown & Sharpe Mfg. Co.
Parent Metal Products, Inc.
Patterson Bros.
South Bend Lathe Works
Williams & Co., J. H.

TOOL ROOM GRINDERS
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Johnson Gas Appliance Co.
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U. S. Army

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Brodhead-Garrett Co.
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Fairgate Rule Co.
Modern School Supplies
Saxcrafts
School Products Co.
Weber Co., F.

TYPE GAUGES
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Rouse Co., H. B.

U

ULTRASONIC THICKNESS MEASURING EQUIPMENT
Magnaflux Corp.

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UNIVERSAL SHEARING & FORMING MACHINES
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Constantine & Son, Albert
Upholstery Supply Co.

V

V-BLOCKS
Challenge Machinery Co.
Patterson Bros.

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Skil Corp.
Snap-on Tools Corp.
South Bend Lathe Works

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Craftsman Wood Service Co.
Giles & Kendall

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Atkins & Co., E. C.
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Milwaukee Tool & Equip. Co., Inc.
Morgan Vise Co.
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Milwaukee Tool & Equip. Co., Inc.
Morgan Vise Co.
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Tolerton Co.
U. S. Burke Machine Tool Div.
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Atlas Press Co.
Brodhead-Garrett Co.
Columbian Vise & Mfg. Co.
DeWalt Products Corp.
Milwaukee Tool & Equip. Co., Inc.
Morgan Vise Co.
Oliver Machinery Co.
Parent Metal Products, Inc.
Patterson Bros.
Sheldon Equipment Co., E. H.
Stanley Tools
Wilton Tool Mfg. Co., Inc.

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U. S. Army

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Donjer Products
General Finishes Sales & Service Co.
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Donjer Products
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Patterson Bros.
Walker-Turner Co., Inc.
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WOODWORKING MACHINES, COMBINATION
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DeWalt Products Corp.
Duro Metal Products Corp.
Northfield Foundry & Machine Co.
Oliver Machinery Co.
Patterson Bros.
Stanley Electric Tools

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Duro Metal Products Corp.
Greenlee Tool Co.
Northfield Foundry & Machine Co.
Oliver Machinery Co.
Patterson Bros.
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Walker-Turner Co., Inc.
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Cincinnati Lathe & Tool Co.
Craftsman Wood Service Co.
DeWalt Products Corp.
Dixon, Inc., William
Duro Metal Products Corp.
Morgan Vise Co.
Old South Pattern Co.
Oliver Machinery Co.
Patterson Bros.
Sheldon Equip. Co., E. H.
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Upholstery Supply Co.
X-acto Crescent Products Co.
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Craftools, Inc.
Dixon, Inc., William
Patterson Bros.
Sheldon Equipment Co., E. H.
Stoner Wood Products Co.
Tolerton Co.

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Snap-on Tools Corp.

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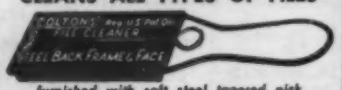

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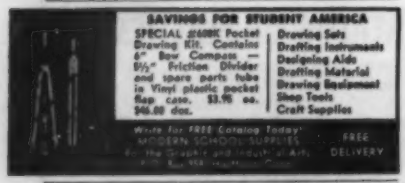
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Designing Aids
Drafting Material
Drawing Equipment
Shop Tools
Craft Supplies
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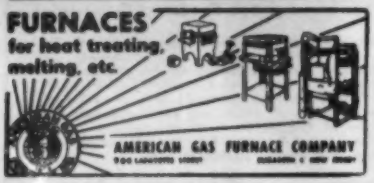
FREE DELIVERY



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For SCHOOL PRINT SHOPS
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MARTIN DRISCOLL & CO.
610 Federal St. Chicago, Ill. Portland, Oregon 407 E. Michigan St. Milwaukee, Wis.

Descriptive Material...

(Continued from page 152)

Listed and described are: Di-Acro Benders in three different models for forming bar and flat stock, tubing, etc., into many shapes and sizes; a Bend-R-Pak; redesigned Spartan Model Di-Acro Box and Pan Brake; three Spartan Model Di-Acro Shears; heavy-duty Di-Acro Notcher; Di-Acro Rod Parter; Spartan Model Di-Acro Rollers; hand operated Di-Acro Press Brake; Di-Acro Turret Punch Press with 12 stations for multiple punching operations; Universal Di-Acro Plastic Press which performs basic thermoforming operations identical to those being carried on in industry.

New school catalog No. 59-1 is available free of charge by writing the manufacturer or contacting a Di-Acro School Distributor.

(For further details encircle index code 0334)

SUNBEAM EQUIPMENT CORPORATION CATALOG

Bulletin SEC-6 entitled "Planning Your School Shop with Furnace Equipment" is designed to be a helpful aid to industrial education directors, school supervisors, shop instructors, and others interested in planning new shop facilities or the expansion of present ones. It is put out by Sunbeam Equipment Corporation.

This 16-page booklet describes and illustrates all of the types of Sunbeam Furnace Equipment practical for school shop use and for use in industry.

Sunbeam Furnace Equipment is available through leading manufacturer representatives throughout the country.

For a copy of the catalog write to the manufacturer.

(For further details encircle index code 0335)

Personal News from Industry...

STARRETT RELOCATES ITS NEW YORK BRANCH

The L. S. Starrett Company announces the relocation of its New York Branch with the opening of an integrated sales office and warehouse building at 48 Commerce St., Springfield, N. J.

Accessibly located, this new branch office provides every modern facility for visiting customers including a large parking lot, attractive reception room, and spacious office quarters.

Distributors and users of Starrett products are assured of faster service and greater convenience.

LOOMS, Table and Foot
REED, RAPHIA
HANDICRAFT SUPPLIES
SEND FOR CATALOG
J. L. HAMMETT CO., CAMBRIDGE, MASS.

SNAP-ON FORMS NEW SALES ORGANIZATION

Rogers Palmer, vice-president and director of marketing, has announced the appointment of Irving Johnson as National Equipment Sales Manager for Snap-on Tools Corporation of Kenosha, Wis.

The new sales organization under Mr. Johnson will operate in the area of the larger and more technical items of automotive, mechanical, and electronic equipment. The organization will consist of factory trained experts, specially chosen and schooled to operate and instruct in the operation of Snap-on equipment.

Equipment salesmen, under Mr. Johnson, will work in all areas of the United States in the sales and training of customers in the use and operation of mechanical and electronic equipment.

RECORDAK ANNOUNCES NEW BRANCH

James M. Arnold, president of Recordak Corporation, Eastman Kodak subsidiary in the microfilming and document copying field, announced further expansion of microfilming equipment and services with the establishment of a new branch office in Hawaii.

Frank E. Lehner is heading the new facilities at Honolulu.

GENERAL SALES MANAGER NAMED

Black & Decker Mfg. Co., has announced the appointment of Glen H. Treslar to the newly created position of General Sales Manager of the electric tool firm's Industrial-Automotive Division.

In his new capacity Mr. Treslar will be responsible for direction and supervision of all Black & Decker sales activities and personnel in the industrial and automotive markets within the United States.

Additional appointments in the Industrial-Automotive Division include: Arthur S. Boehm appointed Sales Manager, Eastern Region; Thomas H. Maddux, Sales Manager, Central Region; and Lester C. Kaefer appointed Sales Manager, Pacific Region.

Joseph H. Schmidt, Jr., has been appointed Director of Marketing Services; John P. Spain has been named General Manager of this division; and Richard C. Wells was appointed Industrial-Automotive Product Planning Manager. All appointments are effective immediately.

BORDEN COMPANY PLANS NEW PLANT

Borden Chemical Company have announced plans to build their new West Coast plant, situated 35 miles from San Francisco, 24 miles from Oakland, and 17 miles from San Jose, in Fremont, Calif. Formal ground-breaking ceremonies were conducted Wednesday, January 27, at the Fremont site.

The new plant will be Borden Chemical's fifth on the West Coast. Other plants in that region are located at Seattle, Wash.; Kent, Wash.; Springfield, Ore.; and Compton (Los Angeles), Calif.

The new California resins and formaldehyde plant is the latest in a series of expansion and acquisition moves by The Borden Chemical Company.

READER'S SERVICE SECTION

INDEX TO SHOP EQUIPMENT

The index and digest of advertisements below are provided for your convenience in requesting free product information, catalogs and literature offered by the advertisers and the manufacturers listed in Shop Equipment News. To obtain this information or literature, encircle code numbers, sign the card, and mail. Your request will receive prompt attention.

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION — March, 1960
400 North Broadway, Milwaukee 1, Wisconsin

Please ask the manufacturers, whose code numbers I have encircled to send me information, catalogs, or product literature offered in this issue.

ADVERTISING INDEX

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GRAND SAFETY STANDARD
MANUFACTURERS SINCE 1921

SHOP CADDY...

Add a "Grand" Lift To Ease Shop Equipment Handling Problems...

Lifts, Moves, Lowers ¼ Ton!

Here is the answer to those heavy equipment moving and material handling problems that arise in every shop department and central school warehouse . . . the GRAND *Shop Caddy*.

Especially engineered in a sure-footed A-frame design, the *Shop Caddy* gives versatile lifting, trucking and on-the- spot positioning . . . even in close quarters . . . without the extra cost of permanent "I" beam installation.

Built of heavy gauge steel, the *Shop Caddy* features a hydraulic 4-speed *Varilift* pump-type power unit . . . capable of lifting 500 lbs. to 36" (54") in less than a minute.

All models come complete with heavy-duty 8" mold-on rubber, roller bearing tires; rubber handle grips and a lifetime warranty against manufacturing or material defects.

(Illust.) Model 4036 $148.80
4054 $179.80
5054 $189.50

New Load Transfer Wheel
The new **Shop Caddy** "load transfer" wheel attachment eliminates the need of holding up the load. To use, simply hydraulically lift the load to desired height for weight trucked and allow the Caddy to rest back on its "3rd wheel" for easier, carefree trucking. **OPTIONAL $13.50**

Model No.	Lift Capacity	Lift Height	Pallet Size	Shipping Weight
4036	500 lbs.	36" Max.	20 x 16"	107 lbs.
4054	500 lbs.	54" Max.	22 x 19"	122 lbs.
5054	500 lbs.	54" Max.	30 x 22"	165 lbs.

Ask about GRAND's complete line of *Trigger Action* "C" Clamps for your metalworking, welding or machine shops!

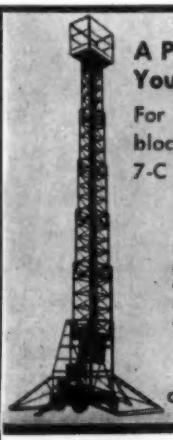
102QL — 2"

4ASL — 4"

Whether you need the heavy-duty *Clampmaster*, light-duty *Quick Lockcet* or extra heavy-duty *Dual Quickcet Bar Clamp*, GRAND's complete shop line of "C" clamps are designed with "trigger actions" for instant gripping and release. All models come with vital operating parts copper plated against welding spatter and rust-proofed for carefree maintenance.

4-12A — 15" and up

For more information on the **Shop Caddy**, complete line of "C" clamps or other **Grand** lifts and hoists, simply attach this coupon to your letterhead or order blank. All prices: F.O.B. Chicago.



A Portable Crane . . . Ideal for Your Automotive Shop

For lifting and positioning motor blocks, nothing beats a GRAND 7-C portable crane.

Also Available: A complete line of heavier lifts and hoists for your every shop and school maintenance need.

GRAND "Sky-Ride" (J3034 — 40') Platform Lift

GRAND SPECIALTIES CO., 3101 W. Grand Ave., Chicago 22, Ill.
Gentlemen: Please send me more information on:
Shop Caddy ☐ "C" Clamps ☐
Portable Crane or Platform Lift ☐

☐ Please send me the Shop Caddy at no charge under your 10-Day Approval "Pre-Paid Freight" Plan.

Name.....
School.....
Address.....
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No "wallflower" lathes in this training shop!

Every one's a student favorite. That's because they're all new, all up-to-date, all exactly the same lathes industry uses. They're all LeBlonds!

Here at Rochester Institute of Technology, students spend all their shop time learning grown-up turning technique on grown-up lathes. No off-days running obsolete or stripped-down "student" models. As a result, students are enthusiastic, the instructor's job is easier and industry appreciates the up-to-date training graduates have been given on modern geared-head machines.

LeBlond Regals and Dual Drives are the training lathes with the big-lathe features. Hardened and ground bedways, tapered spindle nose, *both* leadscrew and feed rod, extra power to hog deep, and sure-smooth controls that help operators develop quickly into confident turning craftsmen.

Look around your training shop. See any "wallflower" lathes? Why not start now to replace them with 1958-model LeBlonds.

With LeBlond Lathes, you're sure of teaching the latest big-lathe turning practice. Write today for full information.

LEBLOND REGAL LATHES
Bulletin R-201T

LEBLOND DUAL-DRIVE LATHES
Bulletin 6T

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THE R. K. LEBLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO
World's Largest Builder of a Complete Line of Lathes for More than 71 Years

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